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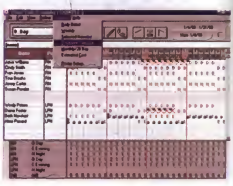

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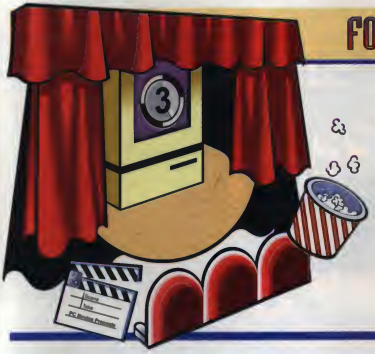

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TECHNOLOGY NEWS

Compiled by Cindy Krushenisky

Electronic Hangover

The years 1994 and 1995 may be remembered as the Wonder Years for the PC market. Consumers rushed in droves to purchase the latest PCs as soon as they hit the market. But this intoxication with computers, as well as with the Internet, may be hitting the hangover stage, according to the market research firm International Data Corp.

PC market growth has slowed, and because there were no big technological advances at the beginning of this year (such as the introduction of a new microprocessor), computer manufacturers can expect slower sales and increased competition. Consumers will drag their feet in 1996 also, in part because the PC-literate consumer market is nearly saturated. According to another research firm, RKS Research & Consulting, about 38% of U.S. homes now have PCs.

The Internet, according to IDC, is another area of the computer industry that's hitting the hangover stage. For most of 1996, the growth in the number of **World Wide Web** users will outpace growth in the number of Web pages. But by the end of the year, the situation will do a "180," with Web destinations overwhelming users. (The World Wide Web is a graphical Internet interface occupied by pages of information with elements linked to related pages.) Internet suppliers will have disappointing financial results, while the Internet's technical capabilities will be pushed to the limits. And although IDC predicts there will be an overwhelming number of Internet users, it expects a high turnover rate as users become underwhelmed by the content on the Web. In fact, IDC predicts that, by the beginning of 1997, 20% of *Fortune* 500 companies with commercial Web sites will close or stop maintaining them, and out of the four major online services (America Online, CompuServe, Prodigy, and The Microsoft Network), two will struggle to survive.

Although it's a grim outlook, there will be some bright points. IDC says that multimedia PC prices must drop dramatically to a range of $800 to $1,000 to reach broader sections of the market. This definitely is a plus for consumers. Internet traffic eventually will bounce back as prices for access drop to the $10 to $15 per month range. IDC foresees that the number of Internet users will rise to more than 200 million during the next five years and to more than 1 billion by the year 2010. And there will always be a market for software. In 1995, the software industry exploded with an 82% increase in profit over 1994. With users upgrading to the new Windows 95 operating system, software companies will see plenty of opportunities for sales in 1996. ●

Hold The Spam

If you send unsolicited E-mail messages or post messages to multiple users through numerous newsgroups, you'd better keep clear of the MCI Internet network. MCI has instituted a "No Spamming" policy to discourage its users from cluttering up other customers' mailboxes with messages they don't want.

MCI's policy is to disconnect and deny access to any MCI Internet network customer who sends unsolicited E-mail messages en masse. This includes all the Internet, E-mail, World Wide Web, and related services MCI offers. "Spamming" to MCI means posting an article or advertisement on multiple newsgroups, posting off-topic articles on newsgroups, or sending unsolicited E-mail to more than 25 users (if the message generates complaints).

While it is only limited to MCI customers, MCI says it initiated the policy to make the Internet more enjoyable and less a source for annoyance to users through its service. ●

Mini-Memory

Computer companies are jumping on-board yet another new bandwagon—the Miniature Card. About the size of a matchbook, the Miniature Card is the industry's smallest memory card, holding about 64 megabytes (MB) of image, text, or voice information.

Besides its size, the new card is also unique because it may link a PC and many digital electronics products, from digital cameras and audio recorders to cellular phones and handheld devices. Products utilizing a Miniature Card can exchange data with computers, creating all kinds of new applications.

Companies supporting the Miniature Card specification and working to incorporate the standard into their products include: Compaq Computer Corp., Hewlett-Packard Co., General Magic, Konica Corp., Microsoft Corp., Nokia Mobile Phones, Olympus Optical, Philips Electronics, Advanced Micro Devices, Fujitsu, Intel Corp., Micron Technology, and Sharp Corp.

The soonest consumers may see the new mini-cards may be mid- to late-1996. Intel says it already has several designs in the works for the Miniature Card and could ship the products during the second quarter of the year. ●

Paperless Bank

Financial institutions and banks, like many businesses with the goal of going paperless, are ready to cut down on the amount of paper that streams through their doors. But just how will they get rid of all those paper checks? They'll digitize them, of course.

Several major banks have begun exchanging digitized images of paper checks over an "open" system called the Interbank Check Imaging system. The Financial Services Technology Consortium (FSTC), which is a group of major banks and technology organizations, developed a system that lets banks transfer check images over secure public telecommunication lines using different computer technologies.

Changing checks into digital form at the bank where they are first deposited might eliminate the need for the several billion paper checks that move through the banking system, cutting the cost of processing each check by about 33%. It would let checks be interchanged at least a day earlier than is now possible, making money more quickly available to consumers, creating better safeguards against fraud, and giving consumers faster access to checks' status.

The system currently is in a pilot stage. The FSTC's next steps include more security features and compression of stored images. ●

Full Circle

When AT&T Bell Laboratories of Holmdel, N.J., say "go wide," it may not mean exactly what you think. Scientists have taken a device invented there full circle—literally and figuratively.

A device used in video cameras, called the charge-coupled device (CCD), was invented in Bell Labs in 1969. Now the device has been incorporated into a panoramic viewer that lets users see live action in 360 degrees from a single vantage point.

Bell Labs' omnidirectional viewer doesn't move. The system uses four CCD cameras aimed upward at four triangular mirrors. Software reverses the mirror images and blends the four pictures into a single, seamless image on the monitor. Users even can choose to go to a close-up on one of the 90-degree images on the screen. The system currently can show seven and half of these panoramic images per second, while additional hardware can display 30 panoramic frames per second, which is more like real-time video.

Currently, Bell Labs is applying for patents for its viewer. Fans at the 1996 Olympic Games in Atlanta will see the system as AT&T unveils the technology at a few indoor and outdoor events. ●

Picture This

What if a computer could see? It could read lips and sign language. During war, it could spot military formations and suggest strategies. According to University of Central Florida in Orlando computer science professor Mubarak Shah, such machines are in our sights.

Through funding from the National Science Foundation, Shah heads a computer vision research team that is perfecting a computer's capability for seeing and interpreting what it sees.

Here's how it works: A camera connected to the computer acts as eyes and feeds images to the computer. But before the computer can recognize an image, someone must spend countless hours feeding images and photographs into the computer to be translated to digitized form and feeding the images in at different angles for three-dimensional viewing. The computer then can match an image it sees to something in its memory banks. Software helps the computer define the edges of an object, its shape, its size, and how it is oriented so it really can recognize the image and "see" it.

So far, Shah's computer has an 85% recognition rate and can read lips, sign language, and certain gestures, although the program can be taught to read other images as well. Someday, however, Shah's research may let computers act as spies in time of war or help a bartender waiting on customers in a noisy room. ●

Wired Wheels

With all the electronics incorporated into today's automobiles, it's hard to tell a car's circuitry from a computer. But most of the circuitry does things we aren't aware of, such as fine-tune gas consumption. Now a couple of automobile and wireless companies are fine-tuning the electronics to do things we can't miss.

Prince, a supplier of automotive interior and electronic systems in Holland, Mich., along with SkyTel, a wireless messaging subsidiary of Tel in Jackson, Miss., has developed The AutoLink System. Using a two-way pager and a **global positioning system (GPS)** receiver by Motorola, the system can prevent and/or solve common problems. (The global positioning system is made up of government satellites.)

For instance, an Emergency Road Assistance feature notifies an emergency response team when an airbag is deployed, and the GPS system locates the vehicle. The system can notify police when the vehicle is stolen, then track the position. Dial an 800 number, and directions to your destination can be paged to you when you're lost. Or a Remote Vehicle Unlocking feature can let motorists unlock a door by calling an 800 number and entering a personal identification number; the AutoLink System will issue a pager command to unlock the doors.

While the system won't be available in the general, consumer market anytime soon, it will be available as a factory-installed option in 1998. Prior to that, you may see the AutoLink System in rental automobiles. ●

Tech Shorts

Early this year, a bill in the Virginia House of Delegates proposed that various online services report any access of their customers to "sexually explicit content." As we went to press, HB 9 had been referred to the Virginia House Committee of Corporations, Insurance, and Banking. The bill faces two obstacles: determining what is sexually explicit material and creating technology that would detect access to such material. Virginia joins several states considering legislation that would regulate the Internet, as well as a bill in Congress that would make it a crime to transmit sexually explicit material over a network....

Sharing documents with co-workers may soon be as easy as making a phone call. Industry leaders such as Microsoft, Intel, AT&T, and others are working to include a standard, called T.120, in their products for **data conferencing** on the PC, which lets people at different locations edit the same file without special hardware. The new interoperability standard would let co-workers with different data-conferencing products work together. The T.120 standard has been ratified by the International Telecommunications Union and was scheduled to be tested at interoperability events in 1996. ●

From VCR To DVD

Entertainment is about to take another giant leap forward. Remember the difference between listening to your favorite tune on CD and on a scratchy record album? Imagine that kind of difference when viewing your favorite movie.

A couple of companies may have provided such a step forward with the announcement of DVD (Digital Video Disc) players for movies on DVDs. DVD is a new standard for high-density discs that can store up to 4.7 gigabytes of information (about seven times the amount on an ordinary CD-ROM) on a single side of a five-inch disc. It can hold about 133 minutes of video (the length of most feature films) on a single side.

The standard was several years in the making. For months, the process came to a standstill when two groups of electronics companies supported two different high-density standards. Eventually the companies—including Philips, Toshiba, Matsushita, Sony, Time Warner, Pioneer, JVC, Hitachi, and Mitsubishi Electric—came to an agreement late in 1995 for specifications that now make up DVD.

So far, Toshiba has introduced two DVD players in the works; Philips and Magnavox have announced work on a DVD player and a DVD-ROM unit (similar to a CD-ROM drive, to use with your computer); and Sony indicated it will work on its own versions.

The companies' proposed features seem pretty attractive. On this digital format, movie producers have the ability to present soundtracks in eight different languages and use up to 32 distinct subtitles. Producers could make movies with multiple story lines, letting the viewer interact with the movie and determine the outcome of a plot. Another promising feature is a parental control system such as the one proposed for the Toshiba system that would let parents select what rating versions can be viewed on the unit—PG, PG-13, R, or NC-17. Then the player will show a version of the movie edited to that rating level by the producers of the movie.

Will all this be enough to persuade consumers to junk their VCRs for a DVD player? It's possible. DVDs won't deteriorate with time and usage like videotape, and some also may be able to play audio CDs. But the cost may start significantly higher than that of VCRs. Prices for most DVD units are not yet available, although Toshiba has announced its units will cost around $600 to $700.

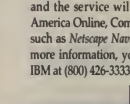
The DVD players are expected to be available in stores around the fall of 1996, or by the end of the year, which is about the same time Hollywood studios will introduce hundreds of movies available on DVDs. For more information, you can reach Toshiba at (800) 631-3811 or (201) 628-8000, Sony at (800) 222-SONY or (941) 731-6060, or Philips at (800) 835-3506 or (615) 521-4316. ●

NewsTicker For The Internet

It's hard to pass up a deal that keeps you up-to-date and has no charge. Thus, you might find IBM's new InfoMarket NewsTicker service hard to resist. If you download IBM's software, you can get news headlines scrolling across the bottom of your screen, just like a newsticker—for free.

The headlines are from current stories provided by Reuters NewsMedia Inc. Click one, and NewsTicker pulls up the story for you to read. The service, at this time, pays for itself through advertising that usually is hotlinked to the advertiser's Web site.

Currently, the service covers U.S. and international news, although future services may include sports, financial, and industry-specific information. To download the software, go to the InfoMarket home page at http://www.infomkt.ibm.com. You may have to jump through a few hoops to actually download and set up the program, and the service will not work through online services, such as America Online, CompuServe, or Prodigy. You must have a browser such as *Netscape Navigator*, *Mosaic*, or *Microsoft Internet Explorer*. For more information, you can contact the InfoMarket Web site or call IBM at (800) 426-3333 or (914) 765-1900. ●



PDAs Return

They're at it again. Consumer electronics companies are making another attempt at the personal digital assistant (PDA) market, hoping this time they'll have a product with sticking power. The year 1993 saw an onslaught of PDAs that let you take notes, keep address books, send faxes and E-mail, or place cellular calls. But the pricey units, costing from $500 to $3,000, never made it big and took a beating because of poor handwriting recognition features.

The product seeking to make a big splash this year is Pilot by U.S. Robotics and its Palm Computing Division in Los Altos, Calif. The handheld, 5.5-ounce device can fit in a shirt pocket. Pilot's big selling point, besides its inexpensive $299 price, is that, unlike other palmtop computers and PDAs, Pilot automatically can synchronize its information with a personal computer or network at the touch of a button.

Pilot features include a built-in scheduler, address book, to-do lists, memo pad, and calculator. However, other manufacturers are developing ties to their products. Many are organizer and personal information managers such as *Lotus Organizer* and *SideKick* from Starfish Software. One interesting feature is a connection to MECA software's *Managing Your Money*, which lets users who bank online connect to their banks wherever they are and perform transactions through the Pilot. The Pilot also will include *Graffiti* software, a handwriting recognition product, as well as a touch-screen display.

If users want to avoid handwriting recognition software, they can "HotSync" the Pilot to desktop or laptop computers in a docking cradle connected to the PC through a cable or modem. HotSync software compares the data on Pilot with the PC and updates both.

The Pilot was expected in consumer electronics stores for computers operating Windows 3.1 and Windows 95 during March. A Macintosh version is due in May. For more information, contact U.S. Robotics' Palm Computing Division at (800) 881-7256. ●

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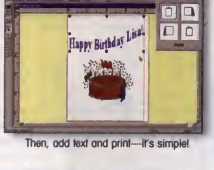

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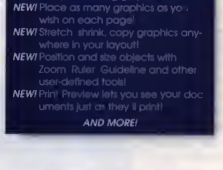

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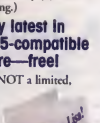

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Take A Time-out!

The makers of *TiMEOUT!* are betting that commercial online service users will pay $29.95 now to save money later. That's the cost of the new software product from Dagar Software Corp. of Bethany, Conn., that monitors a computer connected to an online service. If the computer sits idle for too long, the program disconnects it from the service.

The program should make a lot of sense to anyone who has ever left their computer "just for a second" only to return hours later to the sound of an imaginary cash register cha-chinging its way to a huge online bill.

TiMEOUT! works like this: You program the name (or names) of the online service you use and tell the computer exactly how long to wait before firing off a couple of warning shots. The warnings consist of an on-screen message and your choice of annoying sounds. If you fail to acknowledge the program's two warnings within the amount of time you set, it automatically disconnects the computer from the online service.

In addition to the time factor, you can control the program's activity and inactivity thresholds. You can set the activity threshold to make sure the program picks up on the smallest amount of activity, or set it so only a great deal of activity registers. You can set the inactivity threshold high, to ignore the periodic messages unattended communications programs send back and forth, or low, to pick up on even the slightest amount of activity. These controls let you tweak the program so it works best with your computer.

The program is simple to install and runs in Windows 3.x, Windows for Workgroups 3.11, and Windows 95. According to the company's press release, the program runs in the background and requires no additional memory. The company will release a Macintosh version later this year.

If you want to give TiMEOUT! a try before you buy, you can visit Dagar's home page at http://www.dagar.com, where you can download a free demonstration version.

For More Information:

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(203) 393-2000 ●

Transferring Data Is A Snap

Anyone who's tried juggling a project between home and office computers knows just how frustrating the task can be. Whichever computer you happen to be using, there are always files and software located on the other computer's hard drive that you must have to get the job done.

Interactive Media Corp. (IMC) has introduced a product that can help. The new KanguruDisk offers a practical way to literally move the guts of one computer into another PC and then back again.

IMC calls the KanguruDisk a "removable plug-and-play hard disk." You can set up the disk internally or externally on any 386 or higher PC. You can install the dock for the internal version in one of your empty bays. The external version plugs into the printer port (a pass-through lets you reconnect the printer). Each KanguruDisk will operate in both the internal and external docks.

Once you have the dock set up, you can use the KanguruDisk just like a hard drive (with capacities of 850MB, 1.3GB, or 1.6GB) to run your software. And when you want to use the same software and files on another computer, you just pop out the one-pound disk and plug it into a dock on the other computer.

The ability to move your entire hard drive from one computer to the next is only one of the KanguruDisk's uses. Some of IMC's other suggestions include: using it for confidential files, so you can store them away from your PC; using it to increase your computer's memory capacity instead of replacing your old drive; and using it as a high-speed backup instead of using a slower tape drive.

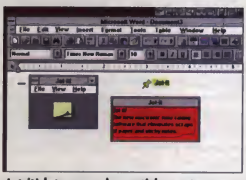
The KanguruDisks themselves cost from about $349 for the 850MB disk to about $599 for the 1.6GB disk. The cost of the docks (Remember: You will probably need at least two) is about $66 each for the internal and about $85 each for the external.

The KanguruDisk lets you transfer an entire hard drive from one PC to the other.

For More Information:

KanguruDisks
Interactive Media Corp.
(508) 429-9070 ●

Jot Yourself A Note—Without Paper



***Jot-it!* lets you place sticky notes anywhere on your PC's desktop.**

The electronic age is upon us. Now available, electronic note-taking software eliminates scraps of paper and sticky notes that clutter desktops and computers. *Jot-it!* is new, "intelligent" software that makes those paper notes an annoyance of the past.

Jot-it! actually can find your notes when you need them, has the ability to write text, attach or record sound, and store the note in the computer. With a patented technology called "Concurrency," Jot-it! keeps track of where the notes are stored. This feature lets Jot-it! create a link between the note and where it was saved. Your notes then appear instantly every time the application, document, window, dialog box, or menu where the note was stored is opened. The note also appears every time you pass the mouse or cursor over the spot where the note was placed.

The program uses the intuitive, drag-and-drop process to peel new notes off the notepad and stick them wherever you want them. You can create as many notes as you want and have up to 26 notes showing at any time. You also can copy one note to multiple application windows and personalize your notes with many other options. You can make changes on how a note looks and sounds, change the title, change the look of the border and title bar, or make the title bar disappear. You even can record voice messages, music, or sound effects, then program the effect to play when the note opens.

Jot-it! is powerful enough to include a thorough help menu system, yet easy enough to use for jotting quick notes of lists, ideas, thoughts, comments, quotes, phone numbers, and more. Because everything is saved, Jot-it! also protects against that important number accidentally going in the trash.

Operating on any Windows or Windows 95 application, Jot-it!'s suggested retail price is $29.95. It's available at leading retail outlets or direct from Evergreen International Technology.

For More Information

Jot-it!
Evergreen International Technology
(800) 667-4340
(604) 936-6121 ●

You Can Make Beautiful Music

Composing music has never been easier. Just sing or play that tune that's been in your head all day, and *Autoscore* will write it down for you.

This revolutionary music software listens to you sing or play an instrument, then records the musical score. What once took two hours at a piano and loss of sanity now only takes the time of the tune for Autoscore to write it down. The notes instantly appear on-screen, ready to be edited, played back, and saved. All a would-be composer needs to make music is a PC and a desire to create.

The program is designed to be user-friendly for even the novice composer. Just released this year, Autoscore represents a step forward in music technology and a more appealing outlook to the beginner. Until now, music software required keyboard skills in order to be used effectively. Autoscore lets those who want to sing or use a saxophone, guitar, or virtually any other instrument quickly and easily score and compose music on the computer without a keyboard.

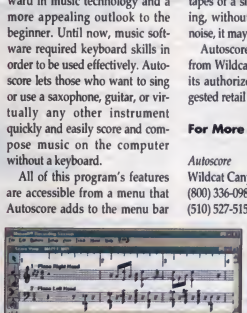
All of this program's features are accessible from a menu that Autoscore adds to the menu bar of all applications. With features such as Instrument Filters, Constrain To Key, and Reference Tones, Autoscore is designed to cut missed notes to a minimum and make editing your creations a breeze. With the elimination of an expensive keyboard, it's now more affordable to get started in computer music. Besides the software, Autoscore includes a microphone and simple-to-use editing program, everything you need to start making beautiful music.

Autoscore works best for instrumental and voice input. It isn't designed to recognize chords, nor will it recognize music played from a tape or CD since the program only works with single lines of music. However, if you have tapes of a single instrument playing, without chords or excessive noise, it may work.

Autoscore is available directly from Wildcat Canyon Software or its authorized dealers for a suggested retail price of $150.

For More Information:

Autoscore
Wildcat Canyon Software
(800) 336-0989
(510) 527-5155 ●



Just sing into Autoscore's microphone, and the program will write down the music for you.

Users can get advice from Emily Post from the Planning Center.

Here Comes The Bride

It's that time of year again—that happy time, that stressful time. If you're just beginning to think about planning an upcoming wedding, or even if you're in the midst of doing so, *Emily Post's Complete Guide to Weddings on CD-ROM* could save your sanity.

Based on the best-selling book "Emily Post's Complete Book of Wedding Etiquette," this wedding guide helps users plan the wedding of their dreams and minimize the anxiety associated with the planning process. With the combination of text, audio, and visual media, it's as if you have your own wedding consultant. This program can help anyone plan a wedding efficiently and economically. The Complete Guide to Weddings is powerful enough for use by professional consultants and simple enough for use by the bride- or groom-to-be.

Emily Post's Complete Guide to Weddings provides many options for wedding planning. The Wedding Planner provides advice on planning the perfect ceremony, reception, and honeymoon. It also includes information on locations, vows, music selections, and etiquette.

The Wedding Consultant mode provides a step-by-step guide through each stage of the planning process. You can utilize specific sections such as the Budget Planner, Invitation Planner, Gift Tracker, Ceremony Planner, Reception Planner, Guest Lists, or Honeymoon Planner.

With the Electronic Wedding Planner And Etiquette Guide, you can create and modify guest lists; organize a budget; record all gifts and thank you notes; view location suggestions for ceremonies, receptions, and honeymoons; listen to sound clips for the ceremony; view menu suggestions and sample pictures of floral designs, plus much more. This CD-ROM is truly a dream come true for anyone in any stage of planning a wedding.

Emily Post's Complete Guide to Weddings is available now in computer stores, bookstores, mass merchandisers, specialty shops, and through a toll-free phone number to HarperCollins Interactive. The price is $39.95 for just the CD-ROM. For $49.95, you get the CD-ROM along with a hardcover edition of "Emily Post's Complete Book of Wedding Etiquette."

For More Information:

Emily Post's Complete Guide To Weddings On CD-ROM
HarperCollins Interactive
(800) 242-7737
(212) 207-7000 ●

Make Sure Software Matches Your System

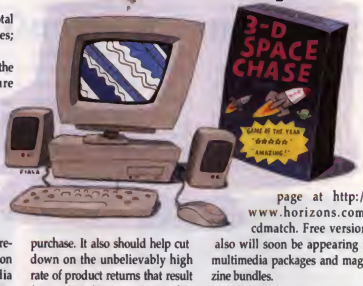
If you use a multimedia computer, you have no doubt experienced the unpleasant feeling of buying a fancy new CD-ROM title only to get it home and find it simply refuses to run on your computer. Fight the urge to throw the whole contraption out the window; there is a better way.

CD MATCH is a free software product you can run in your computer to find out exactly what you have for multimedia capabilities. The program even can provide a handy printout you can take along on your next software shopping trip.

The printout consists of a table that outlines your system's various capabilities. Items on the list include: the type of operating system (DOS, Windows 3.1, Windows 95, OS/2 Warp); the CPU type and speed; the amount of total and available hard drive space; total memory; graphics capabilities; CD-ROM speed; and audio.

All you have to do is take the printout along and make sure your system's capabilities match up with the list of requirements on the software. In the future, most CD-ROM titles will use the same table to list the software's system requirements, which should make comparing the two even easier.

Horizons Technology Inc. created CD MATCH in cooperation with the Interactive Multimedia Association, a trade organization made up of more than 400 companies active in the CD-ROM market. According to an IMA press release, the CD MATCH software will make it easier for the average consumer to make a CD-ROM purchase. It also should help cut down on the unbelievably high rate of product returns that result from people buying software that is incompatible with their computer systems.



CD MATCH is easy to run and is available free to computer users with access to the Internet on the Horizons Technology Inc. home page at http://www.horizons.com/cdmatch. Free versions also will soon be appearing in multimedia packages and magazine bundles.

For More Information:

CD MATCH
Interactive Media Association
(410) 626-1380 ●

6 Ways to Maximize Your Potential With a PC

OK. You've got your PC up and running. So why is it that you find yourself multitasking more often than your computer? System configuration, learning new applications, hardware upgrades — wasn't this thing supposed to make your life *easier*?

As you've probably realized, getting the most out of your PC is going to take some time and effort. The question is, are you going to learn how to do it the easy way or the hard way?

The hard way involves a lot of system lock-ups, error messages, and incomprehensible manuals that seem to have been written in some kind of Ph.D. code. Not to mention the joy of holding the line for the next available service representative.

The easy way is...well, easier. Step-by-step instructions about the specific topics you're interested in. "Hands-on" exercises that give you the practical experience you need to master PC skills. Lessons written in plain English — not "technobabble."

Where can you find this easy way to learn PC skills? Actually, it's sent right to your home. It's ICS *distance education*, and it's been the educational method of choice for millions of busy adults who wanted improved skills but didn't want to waste their time and money.

ICS offers a variety of fascinating and useful courses that you can take at home in your spare time. There's no need to rearrange your schedule or travel to class when you study the ICS way! Your "class schedule" is as flexible as you are.

But just because you study at home doesn't mean you're alone. ICS has a trained and experienced staff of instructors who are just a toll-free phone call away. You can also get in touch with the school via their web site, at **http://www.icslearn.com**

Here are five specialized at-home training programs offered by ICS, plus another course for beginners. If you wish to find out more about ICS training, contact ICS at the phone number or address listed at the end of this page for a FREE information package.

1. PC Repair

Learn the skills you need to repair and upgrade your PC for a fraction of what it would cost at a repair shop. This fascinating, step-by-step program teaches you everything from preventive maintenance to software diagnostics. Plus, you also get A+ Certification exam preparation — so you'll be ready to take the certification test that's fast becoming the standard for PC Repair Technicians across the country. In fact, the PC Repair Course is so comprehensive that you'll be able to use it to make extra cash upgrading or fixing PCs for people in your neighborhood. And, of course, you'll save plenty of time and money on your own repairs.

2. PC Specialist

Get "up-to-speed" with essential home and office software applications. The ICS PC Specialist Course gives you an overview of word processing, databases, spreadsheets, and telecommunications. Then you put your lessons into real-life practice using the Microsoft® Works™ software ICS sends you! Complete your training in as little as six months, and keep the software forever.

3. Computer Programming in BASIC

If you're interested in computer programming, this is the way to get started. You learn to write useful programs in QuickBASIC, an easy-to-use programming language. Plus, you also learn the principles of computer programming — knowledge that will make it that much easier to move on to programming in more complicated languages.

4. Applied Computer Science

Get comprehensive computer knowledge and earn your Associate in Specialized Business Degree in just two years — without setting foot in college or tech school. This four-semester degree program teaches you about business computer applications, systems design, programming, systems analysis, management information systems, and more.

5. Desktop Publishing

Get skills that you can use to design and produce your own invitations, holiday greeting cards, newsletters, and much more. Step-by-step lessons teach you the principles of Desktop Publishing, and then you get practical exercises using the Microsoft® software ICS includes with the course. You can use your new skills to get a better job or even open up your own desktop publishing business! Or, create fun and exciting designs for your friends and family.

6. PC Fundamentals

If you're a complete beginner with PCs, or know someone who is, this personal enrichment course is for you. Easy, step-by-step lessons guide computer neophytes through the pitfalls of PC literacy. The training includes instruction about software applications, hardware components, and more. Plus, at the end of your training you receive CD-ROM tutorials that teach you Microsoft® applications like Windows® 95 and Excel™.

ICS Training "In Focus"

A look at a specific ICS training program.

Check the advantages of the ICS PC Repair Course:
✔ Includes A+ Certification preparation
✔ Nationally accredited by the DETC
✔ Used by "Fortune 500" companies
✔ Includes professional-quality tools and diagnostic software
✔ Reviewed and approved by IACET

Send for FREE information

Call or write today for your free information package about any one of these exciting ICS computer training programs.

ICS training is nationally accredited by the Distance Education and Training Council (DETC), which has been designated as an accrediting agency of distance education schools by the U.S. Department of Education. Established in 1890, ICS boasts a student body of more than 200,000 world wide, and over the past 100 years more than 10,000,000 men and women have chosen ICS for their career training.

FOR MORE INFORMATION, contact ICS by calling toll free: Call anytime, 24 hours a day—7 days a week.

1-800-595-5505, Ext. 8457

Or write to: ICS Learning Systems, Dept. AA55465, 925 Oak Street, Scranton, PA 18515. Internet World Wide Web address: http://www.icslearn.com

The school will send you free information and a color brochure about the training program you're most interested in. There's no obligation, so contact ICS today!

100Y

Managing Files In The DOS Directory

If you've been computing for more than a year or two, you've installed a lot of software. Some of the programs may be DOS applications such as *WordPerfect* and *Quattro Pro*, while others may be Windows 3.1 and the myriad of applications available to users of that product.

Unfortunately, MS-DOS 6.x will install up to 145 useless files in a directory it creates during installation. The number of files stored in your DOS directory will vary with the options you chose during installation.

Not only does DOS install programs you'll never use, it also may direct applications to store temporary files there as well. **Temporary files** are those created as "workspaces" for programs. Programs are supposed to use these workspaces only while they are running. Some erase these temporary workspace files when the programs are closed, while others create temporary (known as "temp") files and leave them all over the place, most notably in your DOS directory.

In addition to your drive giving up precious storage space to temp and needless DOS files, you'll find that programs for both DOS and Windows place their own files there—unknown to you—that won't be properly removed when you delete the unwanted program from your computer.

Seasoned computer users will find their PCs clogged with obsolete DOS files, old .TMP files, and other hangers-on that should no longer be on their systems at all.

Cleaning House

In this article, we'll show you how to spot unwelcome files on your computer, then we'll explain how to clean your system up a bit. (*NOTE: Before we begin, we must caution you that you should **always** do a backup before you start deleting files. People do make mistakes, and a backup is the only way to avoid having to re-install all your software.*)

Here are a few things you can expect to find in your DOS directory:

- The latest DOS files that are needed to run your computer and software.
- DOS files that were installed by previous versions of MS-DOS and are no longer in use.
- Temp files that haven't been properly erased by originating DOS and Windows applications.
- Windows application files that are needed to run a Windows program.

We're going to show you how to figure out which of these mysterious DOS files you can and can't delete.

One way to spot legitimate DOS files is to look at the time and date stamp. All MS-DOS files of the same version have the same date and time stamp. This stamp on a file indicates when that file was created or last modified. By using a shell program or even the DOS DIR/P command, you can review the dates of all files in the current directory.

Older DOS files will have a more distant date and time stamp. If you find DOS files that are described in your MS-DOS manual but have an older time and date stamp, refer to your manual for the actual uses for these files. You *should* be able to delete them safely, but *don't* delete anything until you have looked up its use in the DOS manual. There's always a chance that you're deleting DOSSHELL or another older DOS program that you really want.

Checking the stamps should show that most files in your DOS directory should be there, as they are part of your current MS-DOS version.

Temp Files

Most temp files are deleted in the process described above. However, things can happen to orphan an unwanted file in your DOS directory.

If you turn off your computer (or it is rebooted) while using a DOS or Windows application, temp files may be left behind. Look for files with a file name extension of .TMP if you've been using DOS software. Windows applications leave temp files with a tilde (~) in the file name. See a tilde? Delete the file.

Before you move on to other things, consider creating a directory to use as a trash can (call it C:\TEMP) for temp files, then edit your Autoexec.bat file so the temp files go to the trash can. Add these lines to your Autoexec.bat, pressing ENTER after each line:

```
temp=C:\temp
tmp=C:\temp
```

Some versions of MS-DOS install Windows programs in the DOS directory. These programs will have a file name extension of .DLL. **DLL** stands for **Dynamic Link Library**, a kind of program file that can be run only by another, more complex program. If you find .DLL files in your DOS directory, you either have opted to install the Windows utilities when you installed DOS 6.x, or another program has put them there. They'll have a date and time stamp that matches your other DOS files. Don't remove these files unless you're sure they aren't needed.

On occasion, take a moment to empty that trash. And while you're at it, sweep under the rug in your DOS directory, and you'll contribute to keeping your system running with optimum hard drive space. ●

by Robert Mullen

Colors By Fuji

(Of course.)

Hey, who turned on the color in the computer products aisle? Fuji. Who else? Their 3.5" 2HD Formatted Rainbow Packs are a brighter, more efficient way to organize your data. And they're a lot more fun, too, of course.

FUJI

Computer Products

Basic Training

Regardless of the operating system you choose, there are a few elementary functions you should understand. This monthly section is your one-stop guide to learning these crucial first steps in DOS, OS/2 Warp, Windows 3.1, and Windows 95. Use it to learn your operating system and see whether others offer a smarter way to work.

BACKING UP FILES

Just because you think it can never happen to you doesn't mean it won't. In case the unthinkable happens and you lose parts of your system, having backup copies of your programs and files on diskette is a good idea. This piece of advice can't be emphasized enough. Just do it.

DOS

1. At the DOS prompt, type **msbackup**. At this point, you *might* be asked to Autoconfigure. The process is not as scary as it sounds; simply follow the prompts.

2. Whether or not you go through the Autoconfigure program, you next will be asked to choose the drive to copy the system files to. Copying to your diskette drive is usually the best option.

3. A Compatibility Test prompt will appear. The compatibility test is optional, but it functions as a little mini-backup test that's run to make sure the format of the diskettes you'll be using is compatible with the files to be copied. To run the test, simply follow the on-screen prompts.

4. At the end of the compatibility test, a menu will appear with five options: Backup, Restore, Compare, Configure, and Quit. Choose Backup.

5. In the Setup File box, select the default.

6. In the Select From dialog box, choose the drive to copy the files from; in this case, select C:. If your system is in a high-risk environment (i.e., is on a network, is subject to frequent downloading from online services, or frequently uses shareware or other questionable software sources), we strongly recommend doing a full system backup at least once.

7. Doing a full backup on a weekly basis can be time-consuming and may not be necessary. The Select Files box lets the user customize the backup to the specific files or groups of files that change most frequently. Once the files and/or directories have been selected, the message to the right of the Select Files box will tell you how many files will be copied and how many formatted diskettes you should have ready.

8. Once the variables have been adjusted, select Backup, and follow the prompts.

OS/2 Warp

1. Double-click the OS/2 prompt icon. Recommendations for the following steps depend on what sort of backup you need to do.

2. To back up the system, type **backup c:*.* a:/s**. (The /S following the command prompts the PC to include all subdirectories in the backup.)

3. To back up large groups of files (whole directories), use the command **backup c:\<directory name>*.* a:/s**. (The <directory name> means you should type the name of the directory you want to back up.)

4. To copy individual files, use the Copy command (i.e., **c:\copy backup.exe a:**).

Windows 3.1

1. Open the Main program group in Program Manager.

2. Open File Manager, then open the Tools menu.

3. Highlight Backup, and click or press ENTER.

4. The program will go through a compatibility test, which consists of a mini-backup and then a quick comparison to make sure the disk contains the files your PC meant to copy. Follow the prompts.

5. Click the Backup button. A window pops up with options to customize your backup.

6. Select a drive to back up from and a drive to back up to.

7. Click the Select Files button.

8. The Select Files screen displays all directories, subdirectories, and files. A nice feature is the Backup Selection Directory Information window that pops up every time you click a directory. This information box tells how many files and how many bytes the directory will use on your backup tape or diskettes.

9. To select a file or directory, highlight it, and double-click.

10. With Windows 3.1, you may back up the entire hard drive by choosing Select All from the File menu or, on some systems, by pressing CTRL-7.

11. You also may do partial backups by utilizing the Include and Exclude buttons. Highlight a file or directory, and click Include or Exclude. A window prompts you to select the specific files you want to include or exclude in your backup.

12. Once you have the method manipulated to your satisfaction, click the Start Backup icon.

Windows 95

1. From the Start menu, select Programs.

2. Go into the Accessories group.

3. Once in Accessories, go to the System Tools file, and select Backup.

4. The first screen you'll see gives you a rundown of the three steps in the backup process: selecting the files to be copied, choosing the destination drive, and finally, beginning the backup process. You can opt to block this screen from being shown again by placing a check in the box in the lower left-hand corner of the screen, or you can use it every time for a refresher course.

5. The next screen gives you the option to do a full system backup. Again, you can choose whether or not to be prompted with this option every time you perform a backup.

6. Finally, you arrive at the window where you're prompted to select the files to back up. Place a check mark in the white box to the left of the file or directory you wish to back up.

7. Once you've selected the files, left-click the Next Step box, then select the destination drive for the backup files.

8. After the drive has been selected, left-click the Start Backup button, and follow the on-screen prompts.

CHANGING YOUR DESKTOP'S APPEARANCE

Staring at a computer screen all day is hard enough on the eyes without the adding harsh color combinations. Depending upon workspace lighting and the condition of your eyes, different color combinations might be easier to see. The solution is to modify your work environment to please you. (*NOTE: Make sure you're careful when editing your Config.sys and Ansi.sys files. Have a backup copy of the files ready on diskette in case something goes awry when you're changing these files.*)

DOS

1. At the C: prompt, type **edit config.sys**.

2. Look for a line that reads **device=c:\dos\ansi.sys**. If this line doesn't appear in your Config.sys file, type it in at the end of the file, exit Config.sys, and restart your PC.

3. Look up the color codes in a DOS manual. If you don't have a manual or their numbers don't work for you, type **help** at the DOS prompt. This command will you take you into the DOS Help file. Ansi.sys, which is the file you'll be working in to change the colors, appears at the very beginning of the list.

4. Click Ansi.sys, or move the cursor to the file, and press ENTER.

5. Scroll through until you see the section on color. Copy down the number codes for the colors. Notice that there are different sets of numbers for the background and text colors. Exit Help.

6. At the DOS prompt, type **edit autoexec.bat**.

7. At the end of the file, type **prompt $e[1;y;xm$p$g** where X equals the background color and Y equals the text color.

8. To change the colors for one DOS session only, type the same prompt command at the C: prompt.

OS/2 Warp

1. Select the System icon group.

2. Click System Setup, and then go into Scheme Palette.

3. From inside the Scheme Palette, the user either can make small changes in a designed scheme or select a new scheme and start over from scratch. Like the Windows operating systems, OS/2 contains a graphic box illustrating the different parts of the dialog boxes and their titles.

4. Although the graphics box looks similar to the one offered in Windows, it doesn't operate the same. Clicking the part of the dialog box you want to select only brings frustration. You must select the part to be changed from the menu to the right of the graphics box. Once a part of the box has been selected, you can manipulate the color.

5. Click the Edit Color button, and a window appears containing a circular color spectrum with a cross-hair running through it. Choosing a spot in the circular spectrum changes the range of color on a linear spectrum to the right. The combination of these two color spectrums allows for some interesting color patches.

Windows 3.1

1. From Program Manager, select the Main program group.

2. Select Control Panel. The two components found in the Win95 Display Properties file are split into two different Control Panel options: Color and Desktop. Desktop controls any background graphics, patterns, wallpaper, and screen savers you may select. Desktop doesn't provide a means to test your selection within the box, so you must make your selection and return to the main screen to see what it looks like. In Color, either select a previously created color scheme, or design your own by selecting your colors piece by piece.

Windows 95

1. Left-click the My Computer icon, then Control Panel.

2. Choose the Display option. The Display Properties file will give you four options: Background, Screen Saver, Appearance, and Settings.

3. To modify the background pattern, scroll through the options under Pattern or Wallpaper; the mock monitor will give you an idea of what your selection will look like. If none of the patterns please you, you can edit the patterns on the left-hand side with the Edit Pattern function, or you can edit the Wallpaper as a .BMP file through the Paint application under the Accessories menu in your Program Manager. If you want to choose a solid color, select None under Pattern and Wallpaper.

4. To change the colors on the dialog boxes, choose the Appearance tab. You may experiment with the color schemes already arranged by Microsoft by left-clicking the down arrow in the Scheme option box. If none of these options suit your fancy, you may construct your own color scheme.

5. To change the color of any part of the pop-up box, left-click that portion in the display windows provided. The item you selected should appear in the Item box under the Scheme option. The Color Selection box is on the same line, to the right of the Item box.

6. Left-click this box, and select your preferred color. Once you've arranged the colors to your satisfaction, you can save this color scheme by left-clicking Save As and naming the file accordingly. ●

by Elizabeth Pamska

Photoediting Software:

How Do The Packages Differ?

Photoediting software for Microsoft Windows is a descendent of the "paint" programs such as *PC Paint Plus* and Paintbrush, which provided the first taste of "computer art" for many PC users. Things have come a long way from the crude, 16-color, "cartoony" images that were the result of these early programs. Current photoediting programs still work with .PCX and .BMP file formats like their ancestors, but that's where the similarity ends. Today's programs emphasize the transformation of existing images as much or more than their creation and provide a bewildering variety of methods and meta-phors for making changes to images.

This review looks at six photoediting programs for Windows 3.1 and/or Windows 95. At the low end (less than $100 normal selling price), we reviewed Quarterdeck's *HiJaak Graphics Suite 95* and *Micrografx PhotoMagic* (sold only as part of *Windows Draw 4.0 for Win-dows 95*). Mid-range image editors ($150 to $300 normal selling price) include *Corel PhotoPaint 6* (also available as part of *CorelDRAW! 6 for Windows 95*) and *Micrografx Picture Publisher 6.0* (sold only as part of the *ABC Graphics Suite for Windows 95*). High-end (with a selling price of more than $300) programs include Fractal Design's *Painter 4.0* (for Windows 3.1, Power Macintosh, and Win95) and *Adobe Photoshop 3.0.5 for Windows 95*. (*NOTE: We had to review Adobe Photoshop for Win95 in its beta version, but the final version should be shipping by now.*)

kOsch

The Hardware You'll Need

As with virtually everything else in the world of Windows, following the officially stated minimums for photoediting software guarantees dreadfully slow performance. Virtually all of the programs reviewed require eight megabytes (MB) of random-access memory (RAM); however, the PhotoMagic component of Micrografx's Windows Draw 4.0 lists a 6MB minimum. Our tests of PhotoMagic on a Toshiba 405CS notebook with 8MB of RAM revealed that even entry-level programs need 16MB of RAM to run properly. We believe a 66MHz 486DX2 or faster machine will work well with these programs, but anything slower, or with less memory, will just frustrate you.

The video card you choose is also important. A good choice would be a video card with 2MB or more of video RAM (VRAM), since this will let you use 16.7 million colors at 800 x 600 or higher resolutions. Your video card should use a 64-bit or wider accelerator chip to drive the large amounts of video data at reasonable speeds.

Finally, we'd also recommend buying the largest monitor you can afford. A 15-inch (diagonal measure) monitor works OK, but a 17-inch or larger unit would be better. If you plan to get serious about photoediting, you'll need the extra horsepower.

Most programs reviewed only are available only for Win95. While this may may involve mean an operating system upgrade for you, the greatly improved ability of Win95 to multitask and use thousands and millions of colors on-screen means that photoediting software under Win95 should be far more stable than under Windows 3.1x. Windows 3.1's notorious 64KB limit on various memory heaps, including the all-important **GDI** heap (for graphics elements), made working with 16-bit (64KB colors) and 24-bit (16.7 million colors) levels difficult. These color depths quickly can exhaust a Windows 3.1 system's GDI heap, leading to system crashes, but they have little effect on a system running under Win95. (The Graphics Device Interface [GDI] is the Windows graphics language used by applications to communicate with the screen and a printer.)

Major Features

All photoediting software, regardless of price, is designed to perform the role of a "digital darkroom," letting you make less-than-perfect images better and enhancing good images with special effects. The products on the market reflect the many possibilities available

in image editing, as well as the differences in approach among different companies.

With any photoediting program, an essential feature is masking. The **mask** is an area drawn over selected portions of the image as a boundary. Within this boundary, you can crop the image to eliminate visual clutter, selectively color-correct, fill with colors, cut to the clipboard, and add special effects. Most image editors let the mask be reversed, or inverted. This lets the mask shield an area from changes happening to the rest of the image. A major feature separating low-end, mid-range, and high-end photoediting software is the varying levels of masking possible.

A second feature that separates the products is the number and types of special visual effects possible. These range from simple distortions to accurate simulations of traditional art forms.

With entry-level photoediting software, you should be able to:

- Adjust contrast
- Adjust brightness
- Adjust colors
- Crop extraneous matter
- Work with TWAIN-compatible scanners meeting the popular TWAIN standard

Low-End Image Editors

Micrografx's PhotoMagic didn't have any problems using the snapshots that were scanned with the already-installed Logitech ScanMan Color hand scanner. If you have several images already scanned, you'll appreciate the ABC Media Manager utility included, which lets you drag and drop images from a "floating" thumbnail listing on-screen directly into PhotoMagic.

This program reminded us a great deal of its elder sibling: Picture Publisher. Its color adjustments were easy to operate, and the masking tools allowed rectangular, elliptical, and polygonal cropping and image selection. By making creative use of the special-effects tools and color controls, a routine "postcard" scene can be transformed into a variety of special images, including an "oil painting" effect. *Kai Power Tools* and other Adobe-compatible plug-in filters can be added to PhotoMagic to expand your creative options.

Many color photos are spoiled by off-colors that come from unfavorable lighting. PhotoMagic's color-balance adjustment will let you color-correct an image dulled by twilight conditions. Since color fills can be set to different levels of transparency, PhotoMagic's fill tools can be used as an alternate means of color-shifting an image for creative purposes.

While PhotoMagic has a large number of special effects, the limited masking controls make it difficult to work with small areas of a scene.

The other low-end product we reviewed, HiJaak Paint, which is part of the HiJaak Graphics Suite 95, takes a diametrically opposite approach to image manipulation compared to its competition. You decide *what* you want to do to an image, *then* select the portion of the image you want to adjust. This difference in methodology can be disconcerting if

Add-ons For Photoediting Programs

While the current crop of photoediting programs offers amazing features, many users will find the need for add-ons. Here are some that you should take a look at, organized by category.

Image library software. Users of *Windows Draw 4.0* (which includes *PhotoMagic*) and *ABC Graphics Suite* (*Picture Publisher* 6.0) should take advantage of the ABC Media Manager utility included in each suite. ABC Media Manager lets users drag and drop clip art, bit maps, photos, flowchart symbols, and other types of graphics directly into the photo editor or other software. The ABC Media Manager solves the problem of graphics conversion and previewing for users and also works with *Microsoft Office 95*, *Novell Perfect Office* 3.0, and other programs supporting OLE 2.0.

HiJaak Graphics Suite 95 users will find that boring, generic icons for images are replaced by thumbnail views within Windows Explorer for easy selection. The included catalog also makes locating graphics by subject simple.

Users of other programs may want to consider adding these programs to get this functionality.

Screen capture. Naturally, the HiJaak Suite includes the latest version of HiJaak's renowned screen capture program, and *Corel PhotoPaint* 6 includes Corel Capture as well. Users of other programs should consider adding similar programs to their collection. While the PRINT SCREEN key *does* send the current screen image to the Windows Clipboard, only a single image can be transferred before it must be retrieved and saved. Most capture utilities let you capture a stream of images to the hard drive saved with sequential names, and HiJaak 95's Capture utility can send multiple images to its own clipboard for processing.

Graphics conversion. While all programs reviewed can work with a wide variety of bit-mapped formats and a few even can work with some draw-type formats, HiJaak 95 is the clear leader in its ability to read and write virtually any bit map, fax, draw-type, or CAD graphics format on PC, Macintosh, Amiga, and other computing platforms. This program (alone or in the HiJaak Suite) is worth buying for this reason.

Morphing software. First introduced to most Americans through Michael Jackson's "Black or White" video a few years ago, **morphing** (gradually changing one image to another) also has become a mainstay of political ads on TV, as Democrats transform Joe Congressman into Newt Gingrich, and Republicans show how similar Jerry Senator and Bill Clinton really are.

Thanks to fast PCs and morphing software, all of us can change something into something else. Popular morphing programs include Gryphon Software's *Digital Morph* and the morphing module built into HiJaak Graphics Suite 3.0 and 95. Since morphing is very system-intensive, expect to wait a while for each of your creations.

Plug-In effects filters. MetaTools' *Kai Power Tools* (now in version 3.0 for Win95) is the leader among the growing field of plug-in special-effects filters. These programs become part of the photo editor's special-effects library and provide on-screen previews of their effects. Corel's PhotoPaint 6 includes samples from Kai Power Tools and XAOS Tools Inc.'s plug-in filters.

you are accustomed to drawing a mask around an image before you start to work with it.

Unlike PhotoMagic, HiJaak Paint didn't recognize the Logitech ScanMan Color scanner, and its online help for enabling the scanner was so cryptic that it was almost useless. We were unable to determine the correct files needed to make HiJaak Paint work with our scanner. You'll probably need to use a separate program to scan your snapshots, then open them in HiJaak Paint for editing—a significant, but not fatal, shortcoming.

HiJaak Paint offers two different classes of special effects: transformations (which let an image or image fragment be distorted in a variety of ways) and effects, including artistic, texture, and image-processing options. These effects are powerful and cumulative, and HiJaak Paint offers an innovative way of helping you see the results in advance. In addition to the normal hypertext Windows help system, HiJaak Paint offers a remarkable Effects Wizard, which shows you a preview of any transformation or other effect you want to use on-screen *before* you select the one you want. The Browse feature continuously rotates through all of the options in a series while also displaying the original sample image.

Unfortunately, color adjustments aren't nearly as easy to do. The HiJaak Paint help system provides step-by-step directions, but an overdependence upon cryptic icons makes color changes harder than with other programs. Once you master the program, though, HiJaak Paint is capable of finding the "punch" that may be missing from your snapshots. The Equalize Colors feature helps bring out the colors hiding in the original version of an image. The ability to undo either the last operation or all operations to an image is valuable, since the lack of a printed or on-CD tutorial for most operations means that users will need to experiment to learn the program's many features.

HiJaak Paint's best feature is the ability to save images in virtually any graphics format. You can select file formats directly or by selecting the target application, which is used by HiJaak Paint to select the best-matched file format. The ability to convert graphics to and from any format makes the HiJaak Suite a good companion to other image-editing programs, even if you prefer a different photo editor.

Mid-Range Photo Editors

What separates mid-range photo editors from their less-than-$100 siblings? The mid-range editors have more—more options, more creative control, and more complexity. But if you want to combine images, you must make mid-range photo editors your minimum requirement.

Both Picture Publisher 6.0 and Corel PhotoPaint 6 offer multilevel undos through a command list. This approach lets you "roll back" a series of image transformations to the best choice if you've experimented too much. PhotoPaint 6 also offers a Checkpoint option for undoing a particular point in a project.

Both programs offer enhanced masking options compared to the entry-level programs, with the ability to add to or take away from existing masks and to create masks based on identical or similar colors ("chroma mask" or "color mask"). This enhanced masking makes it easier to perform multistage transformations. Picture Publisher also offers users a "paint on mask" approach to masking. These features were used to take a silhouette of boys with wooden swords and create the eerie, otherworldly image that accompanies this article from an existing photograph in Picture Publisher.

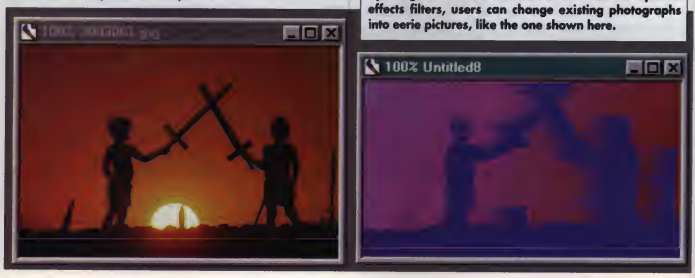
A chroma mask was used to highlight the sky, then the mask was reversed to select the boys with wooden swords. Next, Create Object From Mask from the Mask menu was used to make the boys into a cut-and-paste object. Then, the image of the boys was copied to the clipboard and pasted into a new image. Finally, the silhouette was filled with a custom color, a gradient fill was used on the background, and a Wind effect was applied using Image, Effects.

Corel's PhotoPaint 6 offers somewhat similar features as Picture Publisher, offering special effects designed to add both two-dimensional and three-dimensional effects to your images. A Lens Flare effect can be added easily through rendering effects available in the program.

Both programs offer layering and floating images to make creations of complex images from multiple sources possible. Also, both programs offer enhancements for the new era of multimedia computing. PhotoPaint 6 can be used to edit AVI files (though sound will be lost), and Picture Publisher can be used to create .GIF files compatible with World Wide Web standards for home pages. Both even support plug-in filters such as Kai Power Tools. (PhotoPaint 6 ships with a sampling from both Kai and Alien Skin libraries.).

Mid-range editors are ideal choices for people who have outgrown the limitations of

By using *Picture Publisher*'s chroma masks and special-effects filters, users can change existing photographs into eerie pictures, like the one shown here.



entry-level photo editors but still need a fast, easy editing environment.

High-End Image Editors

At the top end of performance, expense, and complexity are programs such as Adobe Photoshop and Fractal Design's Painter 4. These programs provide a full range of artistic tools that allow the complete transformation of photographs and other bit-mapped artwork into true graphic art.

Adobe Photoshop 3.0.5 (a Win95-native version reviewed in late beta) is, as the name implies, the ultimate "digital darkroom" program. It works fast to allow more photographic-style transformations than other programs. Underexposed, overexposed? Too much or too little color? No problem with Photoshop. Photoshop's controls and terminology are similar to those used in traditional photography, so photographers moving from the darkroom to its PC equivalent will find the trip a short and comfortable one.

Adobe Photoshop's image controls make "after the fact" photo-style effects easy to perform. For example, you can take a traditional studio portrait and use a radial blur to create an effect similar to one available with special-effects glass or plastic filters on camera lenses. One of the greatest advantages of Photoshop is that photographers can shoot "straight" shots, which are easier to take and less likely to fail, then go to their PCs to apply techniques that were once limited to messy darkrooms or "one shot is all you get" in-camera methods. Even selective lightening ("dodging" to old darkroom hands) uses the same "lollipop" tool that photo printers use in the darkroom to keep excess light from hitting the photo paper.

Fractal Design's Painter 4 is a very different product and should be considered a complement, rather than a competitor, to Photoshop. Painter 4 is the fourth version of Fractal's "natural media" imaging software. It's designed to help graphics artists create both original artwork and change photographs to resemble all types of traditional paintings and realistic digital mosaics.

Painter comes complete with sample scripts that can create amazingly detailed images automatically while using many of its unique features. Painter's output is designed to look similar to traditional media rather than the usual hard-edged digital imagery other photo editors create.

Painter's tools include Cloning and Tracing Paper. These, combined with the ability to reproduce chalk drawings, make it easy to transform an ordinary photograph into an impressionistic sketch. For users who would like to explore the "natural media" features of Painter at a lower cost, Fractal Designs offers *Dabbler*, which comes with a variety of art tutorial materials.

Choosing A Photoediting Program

As the discussion of projects indicates, each of the programs reviewed offers special features to the budding photo editor. Choosing the right photo editor depends partly upon the user's budget but more upon the features and "personality" of the programs in question.

The features table on this page should be helpful in selecting the best editing program for your needs. ●

by Mark Edward Soper

For More Information:

Digital Morph
Gryphon Software Corp.
(800) 795-0981
(619) 536-8815

Hijaak Graphics Suite 95
Quarterdeck
(800) 354-3222
(813) 523-9700

Kai Power Tools
MetaTools Inc.
(800) 472-9025
(805) 566-6200

Painter 4
Fractal Design
(800) 297-2665
(408) 688-5300

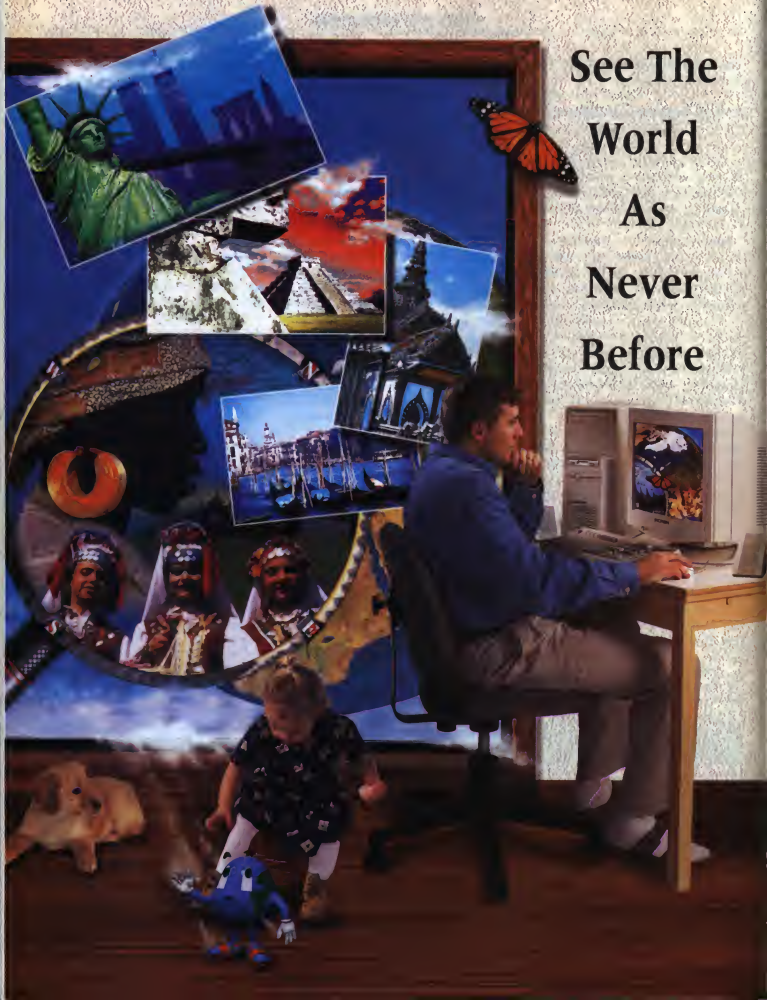
PhotoMagic
Picture Publisher 6.0
Micrografx
(800) 352-5843
(800) 360-8464

PhotoPaint 6
CorelDraw 6
Corel Corp.
(800) 772-6735
(613) 728-8200

Photoshop
Adobe Systems Inc.
(415) 961-4400

Photoediting Programs

	Micrografx PhotoMagic	HiJaak Paint	Micrografx Picture Publisher	Corel PhotoPaint	Adobe Photoshop	Fractal Design Painter
Features						
Basic Masking & Cropping	X	X	X	X	X	X
TWAIN Scanner Support	X	X	X	X	X	X
Freehand Masking	X		X	X	X	X
Masking By Color			X	X	X	X
Color Correction	X	X	X	X	X	X
Basic Special Effects	X	X	X	X	X	X
Plug-In Filters	X		X	X	X	X
Layering			X	X	X	X
Multiple-Level Undo		X	X	X	X	X
Light Source Controls					X	X
Photo-Style Retouch Tools					X	
Traditional Media Tools				X		X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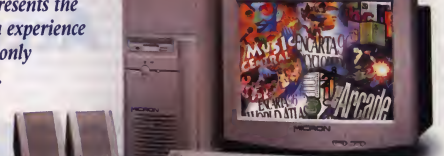

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- Microsoft Windows® 95 CD & Microsoft Plus 95
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- PCI 64-bit video, MPEG, 2MB EDO
- 17" Micron 17FGx, .26dp (15.8" display)
- *Tool-free* mini-tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 CD & Microsoft Plus 95
- Microsoft Office 4 & Bookshelf 95 CDs
- **Microsoft Home Pak includes:** Works 4.0 for Windows 95; Publisher Deluxe for Windows 95; Encarta 96; Encarta 96 World Atlas; Music Central 96; Wine Guide; Arcade 1.0; Scenes–Sports Extremes Collection; Cinemania 96; Julia Child Home Cooking; Best of Windows Entertainment Pack; Money 4.0 for Windows 95; Holiday CD Sampler.
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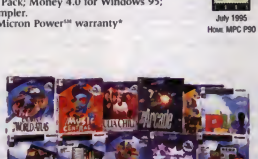
Microsoft Home software is the most spectacular collection of educational and entertainment software assembled in a single package. There's something everyone in the family will love from the fabulous new Encarta 96 World Atlas to the assortment of exciting games in Best of Windows Entertainment Pack.



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Understanding Graphics Accelerator Cards

Though every PC has a video card that sends images from your programs to the monitor, some of these video cards are also accelerator cards. Simply put, with an accelerator, images get to, and move about, your monitor more quickly.

While many of us have an irrational lust to own the fastest toy on the block, there are also some practical reasons for insisting your new computer have a better-than-standard graphics accelerator or for buying one for your old computer. We'll talk about these reasons and also discuss cheap adjustments or add-ons for existing cards that can double performance.

Speeding It Up

Graphics accelerator is a fuzzy term. All but some pre-1990, plain VGA cards (or cheap new ones) do *some* accelerating. Therefore, seeing "accelerator" printed on a card's box means little. To create more confusion, there are multimedia accelerators and video accelerators. In order to explain what these cards are and how they work, we'll need to use some technical terms, such as color depth, pixels, resolution, refresh rate, video RAM (VRAM), and video driver. Not sure what these mean? Then turn to "Improve Your Image" in this issue before proceeding with this article.

Up until the mid-1980s, PCs were **text-based**. When a program needed an "a" on the monitor, it sent a tiny code that said "print an 'a' on the screen". With Windows, instead of one code for an "a," the computer sends each of the tiny dots (**pixels**) comprising "a" to the monitor, causing a massive amount of dots/pixels to be moved from the software to the monitor. Here's the path these images take: They go from your program to your video driver (both work off your computer's central processing unit [CPU]) to the **bus** (slot where the video card is housed) to the card and finally to the monitor. With hungry 32-bit operating systems (Windows 95 and OS/2), new features put even more graphics through the card. When the image goes through a video card's components, it's "drawn" (or calculated) onto some scratch memory in the card called **video RAM**. (Video RAM is separate from the main motherboard RAM.) The tiny graphics processor/accelerator chip moves manipulated images in that video RAM, either in 16-, 32-, 64-, or 128-bit chunks, giving a card its designation as, say, a 64-bit card.

32-bit cards are faster than 16-bit cards, and 128-bit cards are even faster. ISA (Industry Standard Architecture), VLB (Video Electronics Standards Association local bus), and PCI (Peripheral Components Interconnect) are bus (slot) types that cards plug into. (See the sidebar "Buses Close Up.") Until 1992 when VLB and PCI arrived on the market, the old ISA bus caused a serious graphics bottleneck. Today, a VLB card usually is faster than an ISA card, and a PCI card is faster than the other two.

Unlike adding main RAM to a computer, adding RAM to video cards usually does *not*

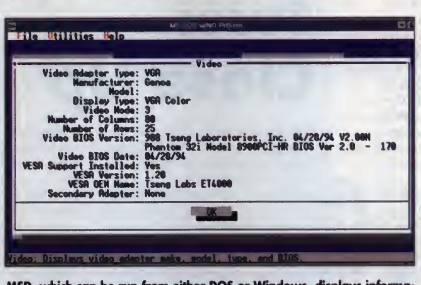
increase speed; it just ups the resolution and color limits. There are two exceptions, however: A 64-bit card with less than two megabytes (MB) of RAM will slow down and act like a 32-bit card, and a 128-bit card with less than 4MB behaves like a 64-bit card. (Unfortunately, video cards often are sold that way.) Incidentally, monitors themselves don't affect graphics speed.

In addition to simply providing the wider 64- (or 128-) bit path, an accelerator card and its driver often use a graphics "shorthand." For example, instead of sending all the dots for, say, a 1-inch square button to the screen, it might send a single instruction that simply says "draw a 1-inch square." This video shorthand (graphics acceleration) takes part of the drawing load off your CPU, letting other operations on the computer proceed more quickly.

Unfortunately, most graphics cards sold with computers until about 1995 were the slower 32-bit or even 16-bit types—even on new VLB and PCI bus computers. The cards in new computers sometimes cut corners in other ways, too. The reason? When shoppers buy a computer, they can easily tell whether the CD-ROM drive or the modem is the speed they want, but there's no simple speed rating of video accelerators that you can read off the box. So even on new computers, manufacturers and buyers often skimp and sell computers with video cards slower than reasonable for a given computer or use. This is particularly sad with Pentiums because the faster your CPU and bus are, the more of a bottleneck the video card can become. Therefore, you need to know what accelerator you're getting on your new computer.

Another factor driving graphics accelerator sales meshes with the decreasing price (and consequent increasing popularity) of large monitors. If you've ever tried increasing the resolution of your 14-inch monitor to 1024 x 768 and then started to go blind because you were squinting at tiny icons, you'll understand why users want a 17-inch monitor. Setting these monitors to 1024 x 768, or even 1280 x 1024, is not only common, it's often desirable because that high of resolution makes for the movement of five times as many pixels, slowing graphics down—unless some accelerator technology steps in to hold the speed up.

For similar reasons, using a "virtual monitor" (see the sidebar "Virtual Monitors") demands acceleration since it encourages using higher resolutions. Having two side-by-side virtual monitors (as, for example, the *Hawkeye* utility with cards from Number Nine) uses resolution of 1152 x 1720 pixels—seven times the standard 640 x 480 resolution. (Even though all the pixels aren't on-screen together, the accelerator still has to manipulate them all.) And any increase in setting your color count (going from 16 colors to 256 to 64,000, etc.) slows things down. So another way of thinking of a graphics accelerator is as a device that makes it practical to run a virtual monitor and, say, have virtually the same convenience as a bigger monitor.



MSD, which can be run from either DOS or Windows, displays information about your system's existing video card and driver.

Graphics cards also affect full-motion video. Watching video clips on some computers reminds us of jerky old movies. In both cases, it's the same problem—not enough frames per second for smooth motion.

Finally, the **refresh rate** often can be set faster on an accelerated graphics card, translating to a pleasant-to-look-at screen image. (The refresh rate refers to how fast the computer renews the screen, which is about 50 to 75 times a second.)

Shopping Tips

Replacing the standard SVGA card on your 33MHz 386 PC with the new ISA-based graphics accelerator will indeed speed it up, though not enough to compete with a 486 with a modest accelerator, and it surely won't justify the $200 price. The same probably applies to an ISA bus 486. You'll probably do better putting that $200 toward a new PCI bus motherboard. Some 100MHz 486 PCI boards are less than $200. But if you can find a used, or marked down, 3-year-old accelerated ISA bus video card for $50 (one that tested well in, say, the 1993 computer magazines and sold originally sold for $300), it might be worth the money.

To decide if it's worth shopping for a new accelerator, you need to know what card you currently have. You could open your case to tell, but you also can try running the Windows utility MsInfo (found in most, but not all, computers) by opening Program Manager's File menu, choosing Run, and typing **msinfo**. The DOS command MSD gives even more information about your video card. Run this either from the DOS prompt or in a DOS window by typing **msd** and pressing ENTER. MSD usually will tell you your video adapter type, manufacturer, model, BIOS type and age, and the video chipset on your board.

If you're just doing word processing (with little graphics or video) and are happy with your graphics speed, steadiness, and resolution, you may not need any more accelerator than you already have. And there are other ways to gain video speed without buying hardware:

1. Lower your monitor's resolution and number of colors. Just because your monitor is *capable* of it doesn't mean you *have* to set your card to a resolution of 1024 x 768 and 64,000 colors. If you don't really need those settings, knock them back down to, say, 800 x 600 at 256 colors.

2. Make sure you're using the newest, fastest Windows (or, for that matter, DOS) video driver software for your card.

Either of these tricks might perk up your graphics speed. And if you have a 64-bit card that has only 1MB of RAM, you probably can upgrade it to 2MB for $50, doubling its speed. Most board's VRAM is user-installable. (It's probably not a great idea to save $10 by buying the VRAM from your local RAM merchant. VRAM from the board maker must meet very high performance specifications that off-the-shelf RAM may not meet.) If you have a 1MB 64-bit card, adding a megabyte of VRAM may be the cheapest performance upgrade you buy for your computer. And if your card is at least 32-bit (16-bit cards aren't worth tweaking), you can try buying a video BIOS update chip from the manufacturer.

Note that there are two kinds of RAM: VRAM is faster than Dynamic RAM (DRAM), though for typical business software and light graphics work, DRAM cards are just fine. (*NOTE: Don't be fooled by the term "Video DRAM." It was coined by a marketing department and is plain DRAM, not the more expensive VRAM.*) Regardless of type, there's a simple arithmetic relationship between the amount of VRAM and the combinations of maximum number of colors and maximum resolution that you can run. This is usually shown in the form of a tiny chart on the manual or the box. (DRAM is the memory inside the main computer.)

Most users will do well with name-brand, 64-bit accelerators that have 2MB of DRAM. However, if you're on a tight budget or only now upgrading to a 486 VLB or PCI motherboard (after living with an ISA bus board), there are some good deals on 32-bit accelerators, which still will be radically faster than your old system's graphics.

Video Clips

Do you play many AVI files (video clips) or need them to be higher quality? Do you want to adjust video playback windows to different sizes without dropping frames or losing definition? Do you plan to edit videos? If so, you may want a board that says it offers hardware support for "video acceleration" or "motion acceleration" (video scaling, full-screen video).

It's not that you can't show video clips without this feature; they just won't be as smooth, clean, or adjustable. For example, as you expand a video clip from 2 x 2 inches to the full screen, you start to drop frames, and it gets jerky. The terms you might find in the card's fine print are that it does "color space conversion" ("YUV" compressed to "RGB") and "hardware scaling of video." An accelerator with this feature should cost about $50 more than its sibling without it.

Even with this level of video motion acceleration, you still may need a software MPEG decoder. (Motion Picture Experts Group [MPEG] is a format in which video/motion clips are commonly stored.) The problem with video clips on computers is that in "raw"

Buses Close Up

The **bus** refers to the slots into which you plug graphics cards and is a set of wires that lets everything on the motherboard share information. Bus type can affect graphics speed so you should be familiar with each bus type when considering a graphics card's features.

- **ISA** (or AT)—This bus is the oldest. Millions exist, but none are being manufactured. ISA survived from 1985 to 1993, despite being slow, because it's cheap, and many cards are made for it. But, running at 8MHz (while some CPUs can run up to 150MHz) and only 16 bits wide, it became a speed bottleneck for disks and graphics. It survives today in that even new PCI and VLB computers have several ISA-type slots.
- **PS/2** (MicroChannel)—This bus was introduced by IBM to replace ISA. It was expensive, fast, and promised simple card installation. It has been ignored by everyone but IBM, is poorly supplied with add-on cards, and is no longer being made by IBM.
- **EISA**—The competition's answer to MicroChannel, EISA is fast, expensive, and with a limited selection of plug-in cards, largely confined to network server computers. Unlike MicroChannel, it accepts regular ISA cards, too. When the war between EISA and MicroChannel ended in 1990, the primitive EISA had won.
- **Local Bus** (Proprietary)—In 1991, computer makers installed a few slots connected directly to the CPU. Though cheap and fast at graphics, each was different; this left owners with slots accepting video cards from the original computer maker. Avoid the used ones.
- **VL-Bus**—In 1992, VESA (Video Electronics Standards Association) announced the VESA local bus (VLB) standard. Three VLB slots are on a VLB motherboard; the rest are ISA. Sometimes it's hard to get more than two VLB devices to coexist. VLB graphics cards are fast, often cheap, and common. VLB motherboards dominated from 1992 to 1994 but are rapidly being displaced by PCI bus boards.
- **PCI**—Intel's answer to VLB. PCI bus boards, like VLB boards, still accept common ISA cards in ISA slots. PCI gets even higher performance, and its Plug-and-Play feature sometimes simplifies getting new cards running with less hassle with jumpers and IRQ conflicts.

form, they'd take tremendous amounts of disk space and send massive amounts of images through the graphics card at too-high speeds. The designers of MPEG (and other video compression schemes) reason like this: Let's say that normally in a movie, we transmit about 30 new, high-resolution images on-screen every second (30 frames per second). That's a lot to stuff on a hard drive or shove through a graphics card each second. But if you examine several adjacent frames on a strip of film, often you'd see that *most* of the pixels don't change from one frame to the next. (Generally, it's only the moving objects in the frame that change.) So MPEG only re-transmits the section of the picture that changes rather than generating an entirely new picture for each frame.

Where do you get an MPEG software driver? It may ship with a video card. For example, Number Nine's 9FX-motion531 card ships with a coupon for Tseng software's MPEG decoder/driver. (The driver has an install procedure that loads it into the Windows Media Player.)

Some cards come with hardware MPEG decoders built into the card (or as an add-on "daughterboard"). Hardware MPEG accelerator/decoders cost about $125 more than a basic accelerator card. They don't require software and sometimes can run video even faster and smoother than the video accelerators using software MPEG support. Though software MPEG works, it can lower your CPU's processing power so other operations on the computer may bog down while viewing MPEG video clips. (The flip side is this: The faster your computer, the less it gains by hardware MPEG.)

Many folks working heavily with video (such as editing videos) and some card manufacturers insist that hardware MPEG is the only way to go. Other industry experts say that unless you absolutely need extra speed, avoid hardware MPEG for these reasons:

1. Faster computers work fine without hardware MPEG.
2. Software MPEG may be safer for two reasons: (a) MPEG standards may change (such as a new MPEG version), which would leave your hardware MPEG obsolete; (b) software MPEG probably will be integrated in Windows 95.

Watch for the boxes that say "supports resolutions *up to* 1280 x 1024", "*up to* 16 million colors", or "*up to* 80Hz refresh rate". If you need 64,000 colors, a refresh rate of more than 72Hz , *and* resolution of 1024 x 768, read the box's chart carefully to make sure it allows all those settings *simultaneously*.

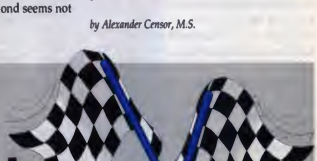
At press time, many accelerators that run with Win95 depended entirely upon the video driver software and utilities provided by Win95. That is, board makers haven't yet provided optimized convenient custom drivers for their cards. This may mean your card will work, but not optimally, and perhaps without a high refresh rate. Number Nine was the first company to have Win95 utilities for its cards, and Diamond seems not too far behind.

Before installing a new card, switch your drivers to standard VGA so the old drivers (which can conflict with the new card and require a midnight technical support call) are no longer loading. Win95's Plug and Play does some of this, but it's best to be cautious.

After the new accelerator and its drivers are working, remove your old card's drivers. To find the drivers' names, look in a file such as Emx.inf or Oem.inf in your WINDOWS\SYSTEM or WINDOWS\INF directory. This file lists which drivers belong to which video card.

Finally, avoid cards without manufacturer's phone numbers and brands with many complaints on online services. True, you can get bargains, but when you need a new video driver or hit a software conflict, you may wish you had a brand with a good customer support record. ●

by Alexander Censor, M.S.



Virtual Monitors

Some of the fancier video accelerator cards' hardware (and/or their own custom video drivers) include a feature sometimes called a **virtual monitor**. With a virtual monitor activated, you can pretend your 15-inch monitor is a window that can slide up, down, left, and right over the face of, say, a giant 30-inch monitor. When your mouse cursor hits the edge of the real monitor, instead of it either stopping or going off-screen, more image area of your virtual monitor scrolls smoothly into view. In other words, your desktop can be much bigger than your actual monitor. With such a 30-inch virtual monitor, it would make sense to set the resolution as high as practical to take full advantage of all your extra monitor space. As for speed: Virtual monitors based on hardware built into the graphics board generally work faster, smoother, and more reliably than ones based just on clever software drivers.

Embedding Graphics In Documents

In this era when slick presentations, Internet-enabled applications, and movies that can be played from a World Wide Web page are as common as PCs themselves, the quality of documents meant to deliver meaningful information is more important than ever. Achieving higher quality is simple, really. Microsoft Windows lets us do much more than ever before, and the applications designed to run under Windows maximize that power.

One of the more striking uses of Windows is its ability to attractively present graphics and sound information in documents. Windows makes this possible with two technologies: **Dynamic Data Exchange** (DDE) and its predecessor, the modern-day powerhouse known as **Object Linking and Embedding** or **OLE**, pronounced "oh-lay."

With Windows, users can copy or cut information to the Windows Clipboard, then paste it into documents, whether they be spreadsheet, image, or textual information objects. The Clipboard is simply a storage place that Windows creates in your PC's memory as a common place to store information until you're ready to use it again.

Even if you've never used DDE, it's easy to try. All Windows applications support the Cut, Copy, and Paste commands in their Edit menus. Some products place these commands elsewhere just to be troublesome, but they're there somewhere. If you used Windows 3.0 applications, you probably pressed SHIFT-INSERT to paste the contents of the Clipboard into a document. You might have used SHIFT-DELETE to cut information from a document, placing it on the Clipboard for later pasting.

Windows 3.1 users found that by pressing CTRL-C, they could copy selected information onto the Clipboard quickly and easily. CTRL-V pastes data from the Clipboard into a document, and CTRL-X cuts selected data from a document, also placing it on the Windows Clipboard.

It's handy to move information back and forth among spreadsheets, word processors, and image-creation tools. But what can you do when the information is constantly changing, and you want readers to be kept up-to-date with the latest developments? It's time to put Windows OLE to work.

Keeping Current

OLE offers the ability to share information among applications. Keep in mind that a document is a piece of white space displayed on-screen by any kind of application and that it can hold any kind of information you add. *Microsoft Word for Windows* creates documents. So does *Microsoft Excel*, the popular spreadsheet product. Consider any new file created with an application to be a "document," and you'll begin to get the picture.

When you paste an object (a piece of text, a section of spreadsheet, or an image), you can change that image whenever you want without having to open the file with the originating application. Simply double-click that object on the page, and the application that created it opens, ready to edit the object for you. If you're sharing work with others on a workgroup or network, you constantly can update a shared document and keep it available to others.

There are many practical ways to use DDE and OLE to combine elements into what are now commonly called **compound documents**, which hold different kinds of information. If you paste a picture into a spreadsheet to jazz it up, or simply to get the company logo onto the page with the numbers, you're creating a compound document. Compound documents are useful because they impress viewers and emphasize information. You can place a graph in a letter to emphasize the impact of business information. You can place a sound file in an E-mail message to a co-worker so that your recorded voice draws attention to particular passages.

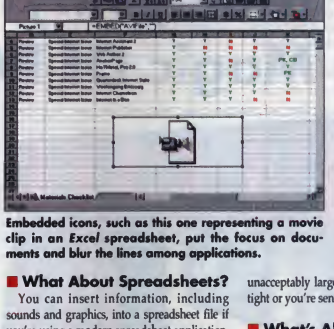
Is it really as simple as creating a video file, placing it in a Windows Write file (created in Windows' bare-bones word processor), and sending it off to the recipient with both text and video intact, ready to read and view? Read on to see how it's done.

Adding Graphics To Word Documents

You can add either a movie or an image to a Word (or other word processing application) document by inserting the image into the document that holds the text. To exemplify this process, we'll use Word for Windows 7 as our word processor. Here's how it works:

1. Start Word.
2. Open the document that will receive your image, and place the cursor where you want the object to appear.
3. Tell Word what type of object is to be inserted into the open document by selecting one of the following options from Word's Insert menu:
   - File—a file containing text and created by Word or another "acceptable" application. You can insert a Write file, another Word file, or a text file into your Word document using this option.
   - Picture—a bit-mapped file, not a vector file like those created by Adobe *PhotoShop* or *CorelDRAW!*. (For information on bit maps and vectors see, "Choosing A Graphics File Format" in this issue.)
   - Object—any kind of information, from sounds to video clips.
   - Frame—a box that will hold any of the above and let you flow text all around it on the page. Place your graphic or other object in a frame if you want the contents of the frame to be movable on the page.
   - Database—can be inserted into a document and can be information converted from an Excel spreadsheet or a *Microsoft Access* database file. Once inserted, database information becomes a **table**, a term that denotes information kept inside multiple grid lines to keep it organized within a Word document.
4. One you select an object type, you'll use a dialog box to pick which file to insert.

Now that you've inserted your data, you'll note that the information you inserted drops into the middle of the document without regard to where it lies on the page. Normally, inserted information leans to the left of your documents. To move the inserted information to the middle or the right side of the page, select the inserted information with a click, then click one of the four buttons on the button bar that affect justification. The result will be the same as you would expect from selecting simple text.



Embedded icons, such as this one representing a movie clip in an *Excel* spreadsheet, put the focus on documents and blur the lines among applications.

What About Spreadsheets?

You can insert information, including sounds and graphics, into a spreadsheet file if you're using a modern spreadsheet application. All you must do is tell Excel, for example, that you want to insert something into your spreadsheet. Use the same methodology as in the set of steps defined under Word.

But you may want more. Maybe you want to place a unique element into that spreadsheet along with today's market forecasts. To do this, drag out your Windows 95 upgrade CD-ROM, and find an .AVI file, a motion picture complete with sound. The file could be more than 50 megabytes (MB) in size and impractical for most uses, but you'll see what's possible if you try this. You always can lower your sights a bit for real applications. Follow these steps:

1. Start Excel.
2. Open the spreadsheet of choice.
3. Select the cell(s) in the spreadsheet to receive the .AVI image. In this case, we're going to insert a movie clip complete with sound.
4. Select Insert, Object from Excel's menu bar, then select an .AVI file to place in your spreadsheet.

Unless you clicked the Display As Icon check box when choosing a file, a titled black box will appear on your spreadsheet after a few seconds. If you save your file with this object embedded in the document, anyone that opens the file can view the movie by double-clicking the black box, which in turn becomes the very screen used for the presentation. If you opted to click the Display As Icon check box while making the insertion, an icon, rather than the black box, will represent the .AVI file. Double-clicking either the icon or the box will run the movie. If you inserted a sound file, double-clicking the icon that represents that sound file will play it.

This system of inserting objects of all types will work in most applications with only slight variations that even beginners can handle. Just remember: The more complex the object of choice, the larger the document file size becomes—causing your document to grow to an unacceptably large size when storage space is tight or you're sending the file in E-mail.

What's Ahead?

Despite the current wealth of ways to place objects in documents you create and items you can add, the future of document creation and management will experience some major upheavals in 1996 and 1997. Microsoft is expected to introduce a new concept in working with software, where every "thing" you make with software starts out as a blank document in a single application window. You'll then add spreadsheet, image, and text objects to that document by clicking buttons that place them in the document. Entire applications will become transparent to the user as this concept is implemented. Large applications will be replaced by a few buttons that share a common button bar in the single document window.

This means the end of loading huge Excel applications just to make a short list or perky graph. It means no more waiting for Word to start just to check a recipe's spelling. You'll do it by "embedding" and working with your graph or text objects in that single document. You'll get slick spell checking only if you want it, and you'll only pay for exactly the features you use, not the whole array of elaborate features you'd never use in a lifetime of creating documents.

Welcome to the world of modular software. It's already on the drawing boards, and the product packaging is under design. It's simply a question of choosing the day when you're ready to learn to harness the new power. ●

by Robert Mullen

Demystifying The Magic Of PC Video

kOsch

It is early morning, hours before dawn, and insomnia has dissolved any hope you once had for sleep. Rather than fight it, you decide to look for something interesting to do.

Soon, you find yourself transported to north Africa, circa 1941. In a lively club, you see a beautiful woman listening dreamily to a pianist's rendition of "As Time Goes By." The barkeep, a melancholy American expatriate, strides across the room and demands to know why he's hearing the forbidden song. He suddenly finds himself face-to-face with his long-lost love. The woman's tear-stained eyes are filled with sadness and regret; the man's face is awash in confusion and anger.

The late movie, right? Actually, this classic scene from "Casablanca," starring Humphrey Bogart and Ingrid Bergman, is brought to you in all its glory on your personal computer through the magic of video. In this instance, the scene is courtesy of Microsoft Corp.'s *Cinemania 96*.

At 3 a.m., you might not be terribly interested in how classic movie scenes are transformed from film to your computer via CD-ROM. In the light of day, however, you will discover it's really not magic at all.

Video and computers have been brought together through a process called **digitizing**. This process transforms the standard, analog video signal associated with VCRs, video cameras, and television into a digital form that can be used by personal computers. The video then is stored frame-by-frame into a buffer, where it is manipulated in a variety of ways to create the final product.

A digital movie, or video clip such as the one from "Casablanca," is actually a sequence of video frames stored to disk. For optimal viewing, video is transmitted at 30 frames per second in North America (25 frames per second in other areas of the world). This speed is considered real-time.

Do It Yourself

Recent advances have brought high-quality video making within reach of the home computer user. Problems can arise, however, because most computers are hard-pressed to transmit video at a rate higher than 15 frames per second, which can look jerky. After all, computers were not initially intended to supplement the VCR. Higher-end systems that contain at least a 90MHz Pentium processor, however, easily can save a digital video at 15 frames per second if the image size is about one-quarter of an average monitor's viewing area.

The advent of the CD-ROM (Compact Disc, Read-Only Memory) and **multimedia** computers introduced many users to computer-based video for the first time. Multimedia is the interactive combination of several elements such as video, sound, graphics, and text. Anyone who has access to a CD-ROM, whether they realize it or not, probably has viewed digital video clips on a computer. The question remains, however: How did it get there?

Before video can be viewed on a home computer, it must be converted into a format the computer can understand and store. This process is commonly referred to as digitizing or capturing and normally requires some additional hardware and software. First, a video digitizing card (a circuit board inside the PC) and video capture software must be installed on your computer. For some users, this may seem more difficult than it's worth, but in most cases, installation is a simple process.

Second, and probably most important, a video source such as a camcorder or a VCR must be connected to the digitizing card. Once the connections are made, simply execute the capture program, and turn on the video source. You now have digitized video on your monitor.

The Digitizing Process

For graphics professionals or home users, the process of digitizing video is relatively simple. A camcorder or VCR is connected to the audio and video ports on the expansion cards installed in the computer. As the original signal is sent into the video digitizing card, the analog-to-digital (A/D) converters on the card change the video and audio source signals into streams of digital data.

Once the video is digitized, it can be played on the computer screen. Depending on the type of digitizing card and the format it supports, the video may be the size of a postage stamp to quarter-screen size or full-length, full-screen, 30 frame-per-second clips.

Digitizing video changes the analog video and audio signals into the standard binary data structure of 1s and 0s (codes for on and off) so computers can understand and work with the data. The size of the digital data stream is compressed in near real-time as the signal is transferred through the digitizing card. The compression process dramatically reduces the size of a video file.

Video compression, which pays big dividends when hard drive storage space is scarce, is the key to digital video on computers. One frame of uncompressed video takes up about 900 **kilobytes (KB**, about one thousand characters) of data. Uncompressed, 30 frames per second of video would create a file of about 27 **megabytes (MB**, about one million characters). To play uncompressed video, a computer would need to move 27MB of data every second from the hard drive to the monitor. Compression reduces this to a manageable level, often less than 300KB per second.

Compression dramatically reduces the size of the digital data stream by using one of several popular technologies, such as Apple's *QuickTime* or Intel's *Indeo*. Compression can reduce the size of a video file by as much as 200%. Any associated audio will remain uncompressed, however, to allow for high-quality audio output with the compressed digital video. During the compression process, the digitizer hardware fuses the digital audio and video into a digital movie format while keeping the audio synchronized with the video when you play back the digital movie file. The digitizing software saves each section of the movie

The Macintosh Advantage: Reality Or Perception?

The first Macintosh by Apple Computer was introduced in January 1984. This innovative desktop computer incorporated graphics and sound capabilities in a revolutionary new way and catapulted Apple to the forefront of the multimedia arena. IBM-compatible computers have been scrambling to catch up ever since.

Apple received another boost when it released *QuickTime* in June 1991 and brought multimedia into the mainstream. QuickTime soon became a standard for integrating media such as video, sound, and animation.

The following year, Apple introduced the AppleCD 300 CD-ROM drive, which had twice the speed of other CD-ROM drives on the market at that time. This further enhanced the multimedia capabilities of the Mac. At the same time, QuickTime 1.5 came out with several enhancements.

Next, Apple and Intel announced a joint project integrating Intel's Indeo video compression technology into *QuickTime*. This meant QuickTime users now had accelerated playback capabilities, integrating MPEG technology into applications using QuickTime.

Playback vs. Authoring Systems

Differences in upgradability traditionally seemed to favor the Mac, especially when it came to converting to a playback system. Computer-based multimedia systems are either playback systems or authoring systems. A **playback system** contains the minimum level of hardware and software to play back multimedia titles. This usually means the addition of a CD-ROM drive and a program such as Microsoft's *Video for Windows*.

To convert into a playback system, Macintoshes required less additional hardware and software than an IBM-compatible computer because the Mac had many built-in capabilities that are just now appearing in PCs. These include enhanced sound and graphics support.

An **authoring system** consists of the computers, software, and external hardware that multimedia developers use to create multimedia titles. The PowerPC, a series of computers from Apple and IBM that use **RISC (Reduced Instruction Set Computing)** processor chips, may become the best machine for multimedia authoring. (RISC is a new type of high-powered processing chip.)

All this power comes with a drawback, however. Currently, the majority of hardware and software vendors have not re-engineered their products to take advantage of the PowerPC's architecture. This means the PowerPC must run current Macintosh software in an emulation mode, which slows down the application speed dramatically.

Until recently, the Mac was a **closed system**. This means that, for the time being, only Apple-built Macintosh computers are widely available. This makes it easier for multimedia developers to adapt to the standard requirements for Mac programs.

A multimedia standard for the PC, however, has helped standardize hardware and software development and helped the PC catch up to Mac. The **MPC (Multimedia Personal Computer)** is a hardware standard developed by Microsoft and other manufacturers. It sets up a minimum requirement list that products or systems should conform to in order to play back multimedia titles. Although hardware conflicts still exist, the MPC standard has greatly eased basic incompatibility problems. And, as Apple flounders financially amid rumors of buyouts, consumer confidence continues to turn increasingly toward MPC machines.

onto the hard drive as that section is compressed. Once the recording stops, the digitizing software puts an end-of-file message on the movie.

The Fun Begins

Now it's time to have some fun with your new video; it's your chance to play movie director. Once the video has been digitized and stored on the hard drive, users can edit the sequence by rearranging segments of the video.

With products such as Asymetrix's *Digital Video Producer* and Adobe Systems' *Adobe Premier*, you can add special effects such as fade ins and fade outs for seamless scene transitions. Users also can overlay text and animation as well as manipulate and enhance particular portions of the clip and save it in many different formats. This process is great for bringing new life to those videos taken on your vacation to Yosemite, business promotional shots, or footage of birthday parties.

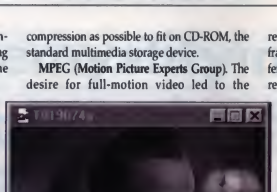
Once the process is completed, you can play back the digitized movie on your computer screen. If the movie uses a custom compression scheme designed specifically for your digitizer card, the file may have to be sent back through the digitizing hardware installed in your PC to speed up playback. Many of today's standards, however, require only runtime modules or viewers to display video produced in a particular format. This lets users show off their creativity by sending small clips of video to family and friends on diskette.

There are a variety of video standards used today. Many are specific to particular hardware or software. The following is a brief overview of some of the most commonly accepted standards:

JPEG (Joint Photographic Experts Group). The JPEG compression standard was originally designed to compress, decompress, and store still images. The JPEG algorithm removes redundant picture information, such as color descriptions, from digitized photographs and other types of stills.

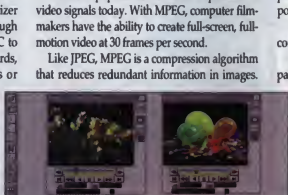
JPEG hardware compression systems can compress images fast enough to play and record video at 30 frames per second, but the 100:1 compression rate JPEG offers is not enough for smooth, full-motion video. A high-quality, full-motion video needs as much compression as possible to fit on CD-ROM, the standard multimedia storage device.

MPEG (Motion Picture Experts Group). The desire for full-motion video led to the development of the MPEG standard. Its development has facilitated the age of television-quality video on PCs. A derivation of the JPEG standard, it's the most popular method for compression of video signals today. With MPEG, computer filmmakers have the ability to create full-screen, full-motion video at 30 frames per second.



A yearning for some classic Bogart might now mean a run to the video-equipped PC rather than the video store.

Like JPEG, MPEG is a compression algorithm that reduces redundant information in images.



The latest video-editing software can turn shaky home videos into something that people outside your family may enjoy watching.

MPEG, however, provides compression ratios up to 200:1 with high-quality images. With MPEG, digital movies will run faster and take up less space than those compressed using JPEG. MPEG works by compressing consecutive frames and making the first frame a reference frame. It then compares the reference frame with the rest of the frames, takes the difference, and compresses it, thereby eliminating redundant data.

While JPEG removes redundant information to compress images within a frame with a process called intraframe compression, MPEG refines this process while further reducing each frame with interframe compression. This reduces the redundant information between frames and shrinks the size of the file. JPEG compresses each frame, while MPEG compresses only key information, such as background images, every half second. Between times, the MPEG algorithm only records changes between the two frames.

The Indeo Standard. This digital video standard from Intel was developed for the IBM PC market. Indeo uses a new chip set incorporating compression algorithms similar to MPEG.

Indeo was initially marketed as DVI (Digital Video Interactive). DVI, however, required specialized hardware to play back images and movies, which had to be sent to Intel to be compressed by their mainframe computers. Not surprisingly, DVI was not terribly popular.

Indeo now enables real-time interaction and control of video on the PC.

"To date, watching video on a PC has been a passive, TV-like experience for end users," says Claude Leglise, Intel's director of developer relations group. "Indeo video interactive totally changes this by making digital video something that can be fully manipulated and interacted with on the PC. With Indeo video interactive, software developers are no longer constrained to the passive, linear playback TV paradigm provided by other, software-only PC video **CODECs (compressor/decompressor algorithms)**."

Indeo features include playback at full-screen with near VHS quality that's comparable to software MPEG when run on a 90MHz or higher Pentium processor-based PC.

Indeo, like MPEG, is a distribution format and is not designed for editing digital video. It's difficult, for example, to randomly access individual frames within an MPEG-based movie. Both MPEG and Indeo compression are formats created to put moving video into the smallest possible files. Smaller files mean video

can be played back from a wide range of storage devices, specifically CD-ROM and hard drives capable of storing one gigabyte (GB, about a billion characters) of data or more. Unlike JPEG files, however, you cannot edit these files because each frame is dependent upon other frames for vital information.

Nonlinear Video Editing. Nonlinear editing systems definitely enhance the creativity of digitized video filmmakers. The image quality with nonlinear systems can vary widely, however, depending upon how much compression is used after the video is digitized.

This process lets users cut and paste digital video in any order to create as many versions as desired. Traditional, or linear, video editing must be done from beginning to end. Any edit needed in the middle of a video, for example, would mean starting again from scratch. Nonlinear software automatically fills in any gap caused by the removal of material in the middle.

Adobe Premiere is a nonlinear editor that lets users create high-quality digital movies by combining video, audio, animation, photos, and graphics. The program can capture video clips from a camcorder or VCR and import them into one of 15 standard file formats. Users also can experiment with special effects such as wipes, dissolves, and irises; overlay text and graphics; and manipulate audio tracks.

A Cross-Platform Multimedia Standard. The variety of graphics formats can be tricky for users who need standard file formats to play on any standard hardware system.

Apple's QuickTime is a system software extension that establishes a common file format to fit different software and hardware applications, providing an interface for editing video. It also is an open-ended system and can recognize custom code from hardware vendors. This lets you use hardware from any QuickTime-compatible application. QuickTime software cannot play full-screen, full-motion video without specific hardware, however. Although designed initially for the Macintosh, a Windows version of QuickTime was released in 1992, providing a cross-platform multimedia standard.

QuickTime software is divided into three main parts: the movie toolbox, the component manager, and the image compression manager. QuickTime has primary, built-in compression and decompression of image files. The CODEC you use is dependent upon what kind of image you are using and what you want to do with it. For video, the Apple Video and Compact Video CODECs compress video so users can play movie files on a Mac.

Ideas For Home

QuickCam by Connectix Corp. is an interesting product for the home filmmaker. It is an inexpensive way to bring black-and-white video into a PC without adding additional hardware. QuickCam supports video up to 24 frames per second (depending upon the size of the image and your computer's speed). QuickCam's QuickMovie software lets users capture and save movies for playback using Microsoft Corp.'s *Video for Windows*.

Intel's *Smart Video Recorder Pro* is a higher-end product that provides a motion-video capture board with software. This product lets users capture and compress video in one step. Its advantages include low disk space requirements and high-quality playback on Pentium and 486 processor-based PCs. The package lets users capture, edit, and play back video from a camera, VCR, laser disc, or other video source. It uses Intel's Indeo video technology, and the board allows one-step, real-time compression.

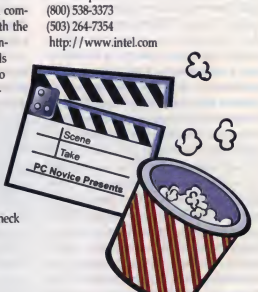
Things To Come

The future of multimedia and digital video seems limitless. Changes likely will have a tremendous impact on home users and developers alike. Advances currently being made in multimedia software and hardware development bring users closer to movie-like video on PCs every day.

Tasks such as videoconferencing on a computer will soon be commonplace to both the home and business user. Advances in compression technology will reduce demands on graphics cards and give sharper video playback. Improved playback technologies will allow full-screen, full-motion video for every computer owner.

However the technology of video and computers evolves, one thing seems certain: The days of computer-based video looking like a poorly dubbed foreign film are numbered. For that effect, you'll probably have to check out "Godzilla" on the late show. ●

by Tracy LeBlanc



For More Information:

Adobe Premier
$559 (all prices street)
Adobe Systems Inc.
(800) 833-6687
(415) 961-4400
http://www.adobe.com

Asymetrix Digital Video Producer
$129 (bundled with *Smart Video Recorder Pro*)
Asymetrix Corp.
(800) 448-6543
(206) 462-0501
http://www.asymetrix.com

Cinemania 96
$39.99
Microsoft Corp.
(800) 426-9400
(206) 882-8080
http://www.microsoft.com

QuickCam
$99
Connectix Corp.
(800) 950-5880
(415) 571-5100
quickcam@connectix.com

QuickTime
$369
Apple Computer Inc.
(800) 282-2732
(408) 996-1010
sw.license@applelink.apple.com

Smart Video Recorder Pro
$459
Intel Corp.
(800) 538-3373
(503) 264-7354
http://www.intel.com

Choosing A Graphics File Format

When it's time to save your computer-made work of art, the choice of a graphics file format may seem simple. There are, after all, only two general graphics file formats available. But that doesn't simplify the choice of how to save a file because each of those basic types has dozens of subsets. The next time you're confronted by a lengthy list of Save As choices, the following primer should help.

Bit Maps & Vectors

Bit maps (also called pixel or raster graphics) are the most common type of graphics file format in the PC world. Bit maps break the graphic into a grid, with a light value assigned to each block (or **pixel**) of the grid. Bit maps excel at recording complex and subtle images such as photographs and computer screen displays.

Bit maps tend to be large files that often use several **megabytes** (**MB**) of storage for photos and even between 1MB and 2MB for a simple screen shot from a PC. When bit maps are enlarged, lines begin to look jagged, and curves develop a "staircase" effect. When bit maps are reduced, resolution may be lost permanently—even after the image is restored to its original size. (A megabyte is a unit of computer memory equal to about one million bytes.)

Vectors tend to be used primarily by CAD (computer-aided design) programs, rendering applications, and similar programs that use simple shapes and shadings. Vector graphics are described mathematically, as equations for lines or shapes, and so provide smooth lines and curves. That method also allows easy enlargements and reductions without the inherent problems associated with bit maps. Vectors, however, cannot represent subtle shadings. They were designed originally for pen **plotters** but now are used for printers, too. (Plotters are printer-like devices for drawing line-based charts and diagrams)

The number of applications that can deal with both bit-mapped and vector formats is increasing, but graphics programs that offer full versions of both types are rare. Instead, they might convert the file and lose many of the subtleties that may have been your reason for choosing that format in the first place.

The most common file formats for PCs are PCX, TIFF, IFF, IMG/TGA, GIF, DXF, HPGL, PCL, PIC, CGM, FLI/FLC, and Windows formats. Macintosh and **Unix** (a high-end operating system commonly used with networks including minicomputers) platforms typically use other formats, but they each support TIFF and GIF. The only formats to worry about are the ones described below.

TIFF

The **Tag Image File Format** is a bit-mapped file that's useful in transferring images among applications or platforms (different operating systems). It handles color, black-and-white, and **grayscale** images nicely, allowing color resolution of up to 48 bits and opacity or transparency. (Grayscale images use various shades of gray to add detail to graphics.) As a major drawback, there are many varieties of TIFF, and some of them are proprietary. As a result, some vendors can claim TIFF compatibility while only providing compatibility with a closed format. Additionally, even with fully supported versions, it becomes necessary to know which variety of TIFF is being used.

The two broad varieties of TIFF are Basic and Extended. The Basic version supports a baseline capability level that mainly affects developers. The newer (since 1992) Extended TIFF versions support advanced color handling features (CMYK [cyan/magenta/yellow/black] and YCbCr, for example) and **JPEG** (**Joint Photographic Experts Group**) or other compression standards. (JPEG compresses graphics by grouping areas of similar color under one heading.) Variations of TIFF support six types of compression ranging from no compression or 8:1 compression on some baseline versions to 10:1 compression on Extended versions.

Compression ratios also depend upon the image itself. A simple, black-and-white line drawing can be compressed far more than a screen shot or a painting. As a rule of thumb, monochrome TIFF files can compress to about 80%. Grayscale TIFF files generally compress between 30% and 50%, and 24-bit, photo-quality images may compress between 5% and 30%. In rare instances, the compressed file actually may be larger than the uncompressed version!

GIF

The **Graphic Interchange Format** was designed for transferring data via the CompuServe online service. It's available on most PCs and many Unix workstations, although it isn't a primary format for any applications. It supports 24-bit color as a palette of up to 256 colors and image sizes up to 64,000 by 64,000 pixels and can overlay multiple images, interlaced screen painting, and text overlays. It includes the well-known LZW (Lempel-Zev & Welch) compression. Despite its advantages, GIF can't store grayscale or color-corrected data or more than 256 24-bit colors. Additionally, GIF files tend to be rather large, so transmissions may take a while.

PCX

The **PCX** bit-mapped format was designed for PC-based paint programs such as Windows Paintbrush and is one of the oldest graphics file formats, making it one of the most widely supported. The current version supports 24-bit

color as a palette of up to 256 colors or as a full, 24-bit RGB (red/green/blue). It handles images of up to 64,000 by 64,000 pixels. The disadvantage is that it can't handle grayscale, color-correction tables, or the more advanced CMYK or HSI (hue/saturation/intensity) color models for advanced color work.

Windows Device Independent Bitmap

This bit map is available under Windows 3.0 and subsequent versions, including Windows 95. It is well-supported within the Windows environment, but non-Windows applications rarely use it. It also can read bit-mapped files from OS/2 Presentation Manager 1.x.

Vector Formats

DXF, the **drawing interchange format**, was designed to exchange CAD images among PCs, Macintoshes, and Unix workstations. It is widely supported in the CAD environment and offers three-dimensional vector formats. Its **ASCII** form is slow to read, but DXF has an option for writing files that limits data to shapes only. (The American Standard Code for Information Interchange is a popular file format.)

HPGL is the **Hewlett-Packard Graphics Language**, designed specifically for line drawings. It works with pen plotters and laser printers and is used widely. Characters are drawn using simple strokes and can be scaled, rotated, and slanted. Its capabilities are based upon those of pen plotters.

PostScript, technically, is a **metafile** (a file that defines other files)—a graphics description language rather than a true file format. It's well-suited for vector graphics but not for bit-mapped images, although it will let bit-mapped files be printed. PostScript was designed for the Macintosh and its peripherals but now supports PC and Unix workstations. Because it relies upon ASCII and, for Level2 PostScript, binary and compressed data, its bit-mapped files are large and slow to display. It is, however, the standard for desktop publishing and offers 36-bit RGB, monochrome, and color standardization and correction.

Data Compression

Even if you never transfer data, pay attention to compression schemes. They can affect image quality, depending upon whether the method is **lossless** (in which no data is lost) or **lossy**, which forever removes some of the data, though the loss should be unnoticeable. Compression works by using redundancy, by predicting information, or by removing unnecessary information. Naturally, the more a file is compressed—or the more complicated the compression method—the longer it takes to compress and then decompress an image.

Run-length compression, in which a series of repeated values is replaced with a single value and a count—i.e., "27 red pixels" rather than listing each 27 times—is used by TIFF, PCX, and other formats. **Huffman encoding** uses shorter codes for frequently occurring values—i.e., "a:1, b:3, c:4" for the sequence "abbbcccc". It was originally designed for text and is used for some variations of TIFF and for the JPEG standard. LZW compression relies upon finding patterns and coding for them. It is used by GIF and TIFF formats. Lossy compression is used most commonly with the JPEG standard, some in TIFF 6.0, and with **MPEG (Motion Picture Experts Group)**, a popular video compression standard.

If you transmit files frequently, it's worth your time to compress the file with a general-purpose compression program such as *PKZIP* or *Arc*. Although many of the standard file formats have compression algorithms built in, the receiver must be able to decompress the file. If you aren't certain which applications the user has, a general-purpose compression program may provide greater flexibility.

Color

There are two basic color schemes: RGB and CMYK. RGB typically is used for monitors and devices that emit light, while CMYK is used for printed materials and tends to produce larger files than RGB formats. CMYK is the better choice for printed images because the colors won't have to be translated by the printer and, thus, will be true. If files are meant for multimedia presentations, use RGB for true color, smaller files, and faster execution.

Choosing Formats

Selecting the best format is a trade-off involving quality, program support at your site and at any receivers' sites, the type of image, its purpose, and whether the image will be stored or transmitted electronically.

To maximize quality, choose a file format with the highest number of bits per pixel. For vector graphics, color PostScript is one of the top applications for a wide range of graphics. For bit-mapped images, TIFF also gives high quality and more compact files.

In terms of flexibility, PostScript and TIFF let images undergo many changes in size, resolution, and color correction across application and across platforms (Windows to Unix, for example).

The size of the file also should be considered, especially if it is to be transmitted online. The most efficient formats, which require the least amount of space for storage or transmission, typically are those with the fewest number of bits per pixel. File compression can further enhance efficiency and should be considered. File support is another concern. Many programs—particularly word processors—can read a variety of graphics formats but can save in only a few.

Just remember that when choosing formats for those graphics you'll share with others, the format could prove as important as the graphic itself. ●

by Gail Dutton

Formats Compared

Format	Type	Color	Bits Per Pixel	Compression
PCX	Bit map	RGB	up to 24	Run-length
DXF	Vector	Color table, unrelated to standard models	N/A	N/A
GIF	Bit map	RGB	up to 24	LZW
PostScript	Metafile	RGB & CMYK	up to 32	N/A
TIFF	Bit map	CMYK & YCbCr (a RGB reconstruction with intensity values)	16	LZW
Windows	Bit map	RGB	1, 4, 8, or 24	Run-length

Turn Your PC Into A Photo Lab

The boxes of photos are piling up from grandparents, parents, and your own family. So are videotapes. And regardless of whether they're neatly pasted into photo albums or piled into boxes in the garage, photos probably are going to waste. Putting those photos into the computer may not help your storage problems, but it will help you make sense of a jumble of images and, in the process, produce some spectacular family albums. The skills you use for a home photo project can be applied at work, letting you create some dynamic presentations that potential clients can access from CD-ROM, videotape, or your company's World Wide Web site.

How complex you make this project is up to you. Inexpensive equipment and software let you produce some very respectable—and very artistic—results, and higher-end, feature-laden versions can yield results that look professional, complete with higher resolutions, more editing tools and options, and smoother and more complex special effects. Regardless of your goal, however, the first hurdle is simply selecting the photos and getting them into the PC.

Services

The simplest method, of course, is to hire someone else to do the actual work. That, however, also takes away part of the fun and, if your project is large, can become just as expensive as buying the hardware and software to do the job yourself.

Print shops, photo shops, online services, and some software manufacturers all offer ways to input your photos. Kinko's copy shops, for example, scan a 6- x 4-inch photo into the PC and do the necessary editing (sizing and contrast) for $10—about $1 per minute. The firm also can save the image to diskette if it's small or to mobile hard drives for larger images.

America Online offers to digitize prints, slides, and negatives for 99 cents each and download them to you. For $24.95 per year, AOL will create an online photo album and let you store up to 100 images. For an additional $9.95 per year, you can create a Picture Circle that lets friends and family view the album. The AOL keyword for this service is **picturepalace**.

Photo shops will digitize photos and put them onto a Kodak Photo CD. It can be more economical to have the prints taken from just-developed negatives than from printed images, depending upon the shop. Prices are based upon a charge for the CD and a charge for each image put onto it. Expect to pay about $10 for the CD and from about 99 cents to more than $2 per image. Prices vary widely, so check several shops.

Even old home movies can be added to your computer image files once they are transferred to videotape and then digitized. (See "Demystifying The Magic Of PC Video" in this issue.) Prices for the film-to-video service are low at local video shops. Your Video Productions in Costa Mesa, Calif., for example, charges $12 for the videotape and $5 for each 50-foot roll of film, with a $35 minimum. From the videotape, you then would need a video grabber to capture still frames or software such as one of Gold Disk's *Video Director* programs to edit video clips from several different videos into one project. To use the latter method, you'll run the video from a VCR and edit it on

a PC. Output can be stored on another videotape or in the PC if you produced a short video clip and have a very large storage space. Note that even a simple screen shot takes about one megabyte (MB) of storage space as a .BMP (bit map) file and less as a compressed video in an MPEG (Motion Picture Experts Group) file.

Scanners

Scanners are a popular choice for digitizing still photos. These devices read documents or images and translate them into data that computers understand. There are a lot of options, including **flatbed**, handheld, portable, and special photo scanners. Flatbed scanners (similar to photocopiers) are best for large documents, while handheld scanners offer a lower price but several disadvantages. (For more information, see "Scanners Turn Documents Into Digital Data" in this issue.)

Photo scanners are designed specifically for scanning photos and therefore are very easy to use. Storm Technology's EasyPhoto Reader and *Easy Photo* software accept photos up to 5 inches x 7 inches. EasyPhoto Reader plugs into the PC's printer port. (The printer plugs into EasyPhoto Reader.) The EasyPhoto imaging software lets you adjust contrast and brightness (so even dark photos can become useable), erase scratches, remove red-eye, adjust color, rotate photos, and crop size images. Images can be saved either in the space-saving JPEG (Joint Photographic Experts Group) or larger bit-mapped file formats. It lists for $249.

Video Capture

Of course, you may want to digitize video clips or still images culled from video in addition to still photos. There are two basic ways to do this: Install a video capture card, or add a frame grabber. Installing a video capture card requires opening the computer and physically inserting the card, but the card can offer onboard video compression, the ability to capture video at VCR quality, and other features depending upon your choice of card.

As one example of what's available, SIIG's Multimedia Video Grabber Plus can display video clips with audio in a resizable window at 30 frames per second—standard video quality—on a VGA monitor under Windows. It also can capture still images from a camcorder, VCR, or TV. It includes image display and capture software and JPEG compression software.

Video frame grabbers offer poorer resolutions—which are typically about 15 frames per second—but are external devices and tend to be less expensive. Video grabbers offer an easy way to grab video images for the PC by connecting to a PC's printer port and offering a standard video jack to allow connections to a VCR, TV, camcorder, or virtually any other video source. If you want to transfer images from old 8 mm home movies, however, you must have them professionally converted onto videotape.

Snappy, by Play, is one of the most popular video frame grabbers on the market. It lists for $199.95. You can adjust the size of the image before it is captured so it will fit the desired space without the need for sizing afterwards. Files can be saved to JPEG, PCX, TIFF, and BMP formats, which are available in Snappy's own software, or Snappy can work easily with other editing applications.

Digital Cameras

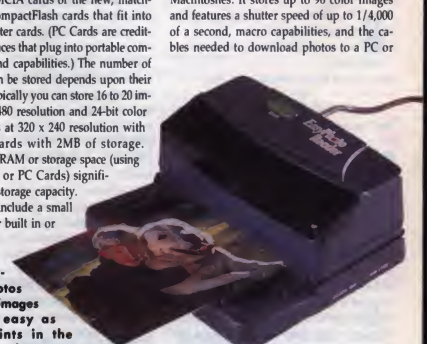
If you're less concerned about archiving existing data than about getting current work into your PC, a digital camera could be for you. Users say digital images are easier to use and more flexible than film-based images, letting you screen shots as you take them, delete poor shots on the spot, and easily input the images into your PC.

These cameras use computer chips rather than traditional film and come in black-and-white-only or color-only models. They store their photos either in the camera itself or on removable **PC Cards**—either the cards formerly known as PCMCIA cards or the new, matchbook-sized CompactFlash cards that fit into PCMCIA adapter cards. (PC Cards are credit-card-sized devices that plug into portable computers to extend capabilities.) The number of photos that can be stored depends upon their resolution—typically you can store 16 to 20 images at 640 x 480 resolution and 24-bit color and 32 images at 320 x 240 resolution with cameras or cards with 2MB of storage. Adding either RAM or storage space (using CompactFlash or PC Cards) significantly boosts storage capacity. Some models include a small monitor, either built in or separately, to let you see the actual image before deciding to keep or erase it.

On the downside, printed resolutions of electronic photos still aren't as good as the results from even a low-end 35 mm camera, but they're getting better. Additionally, the flash must recharge after each shot, and enlargements beyond the standard 3- x 5-inch format aren't supported. That said, these cameras can be ideal for claims adjusters, real estate agents, and others who need a quick, easy way to get a picture into the PC. Prices are still hovering around $1,000, but some manufacturers have introduced highly capable cameras for significantly less.

Epson's PhotoPC is the first color digital camera that costs less than $500. It offers 24-bit color, two flash modes, a choice of either 640 x 480 or 320 x 240 resolution and can accept 37 mm lenses (the same size as for camcorders.) With 4MB additional RAM, the camera's maximum 16-image capacity at high resolution can be boosted to 80 high resolution or 160 standard resolution images, and users can delete the last image or all of the images. The autofocus lens is the equivalent of a 43 mm lens on a 35 mm camera and has a depth of field from two feet to infinity. Shutter speeds range from 1/30 to 1/10,000 of a second. It does not use PC Cards but attaches directly to the PC's serial port for image downloading.

Casio's digital camera offers a built-in color LCD monitor for fast, easy photo viewing and connects to both PCs and Macintoshes. It stores up to 96 color images and features a shutter speed of up to 1/4,000 of a second, macro capabilities, and the cables needed to download photos to a PC or



Turning traditional photos into digital images can be as easy as placing prints in the EasyPhoto Reader.

Mac. It was advertised for $649 during a January sale at Fry's Electronics.

Downloading Images

Downloading images from the Internet or photo-archiving services is another option and offers a way to get professional-quality photos and access to some interesting photo archives. Each source has its own rules and charges, but many photos are in the public domain or are available for a slight charge. When surfing the 'Net, however, remember that unless a photo or photo collection is marked "Public Domain," you need the owner's permission to use it.

CompuServe includes the Bettmann Archive Forum (Go: **bettmann**) that includes the United Press International photo library and the photos brought from Hitler's Germany by Dr. Otto Bettmann in 1933, as well as the Archive Photos Forum (Go: **archive**) that is a world-class source of historical engravings, drawings, and photographs on a wide variety of subjects from ancient times through the modern era. America Online boasts the PC Graphics & Animation Forum (Keyword: **pc graphics**) that includes clip art and animation files. Likewise, Prodigy includes the News Photos section (Jump: **photos**) that includes photos from leading newspapers. A host of World Wide Web sites also offer downloadable photos and art, including:

alt.ascii-art
alt.ascii-art.animation
http://www.mccannas.com
http://www.uky.edu/Artsource/artsource-home.html
http://www.bizcafe.com/freegrfx.html

For more information, see "Downloading And Viewing Images" in this issue.

Photo Editing

Once you get the images into the PC, you'll need image-editing software. Often the editing software will come bundled with the hardware. Scanners, for example, typically come with graphics-editing software. Other packages come separately, and minimal editing capabilities may be included in other applications, such as Banner Blue's *Family Tree Maker* genealogy program, which lets users produce slide shows, import graphics files, embed objects such as home video clips, crop and rotate photos, and compress files using the JPEG standard.

Some users produce multigenerational family snapshots combining photos from the first days of photography through the current year.

If you really need high-quality photo editing and a full range of graphics capabilities, consider a professional graphics package such as *Adobe Photoshop* 3.0 for Windows or *CorelDRAW!* 5 or 6. Each of these packages offers robust editing tools that let you retouch, size, add special effects, and otherwise alter color and black-and-white photos, and even prepare color separations for professional printing. (For full reviews, see "Photoediting Software: How Do The Packages Differ?" in this issue.) If you need something less comprehensive, any number of entry-level programs for less than $100 will do a fine job of basic editing, letting you crop, size, and retouch scratches or adjust contrast.

In addition, you'll also need a software package that uses your photos. That may be a photo album that organizes your digital images, a desktop publishing program that uses photos and other illustrations, presentation software for multimedia, a word processing package for simpler projects, or a genealogy program that lets you scan in family portraits. As multimedia becomes more popular, an increasing number of applications support the use of photos and other graphics. When choosing programs, look for applications that support OLE (Object Linking and Embedding) and that allow images to be pasted into text.

Cost

Before you invest in equipment and software for a one-time use, do a cost comparison. To archive existing photos yourself, plan on buying a color scanner (about $400) that comes with its own editing software. Or, buy a special photo scanner (less than $300). To help put that into perspective, America Online will digitize photos for 99 cents each, so for $400, you could hire America Online to digitize 404 photos. The cost of putting 400 photos onto CD could range from $400 to $800 plus the cost of the discs.

For about another $60, you can buy software to organize the photos. For example, rather than having just a jumble of photos—like too many photo albums—you may want to organize them to produce groupings based upon timelines, family groups, vacations, or even themes. Some users even have produced nice, multigenerational family snapshots, culling portraits of famous ancestors from museums and books and combining them with family photos from the first days of photography through the current year.

The bottom line is that for an investment of about $350, you can put together a basic system to scan, edit, and organize photos. For about $100 more, you can include legal-size text and art. Or, you can use a service for the digitization and spend about $60 organizing the photos into logical, attractive groupings. Whether it's worth the price—and the time—is up to you, but the capability offers some intriguing possibilities. ●

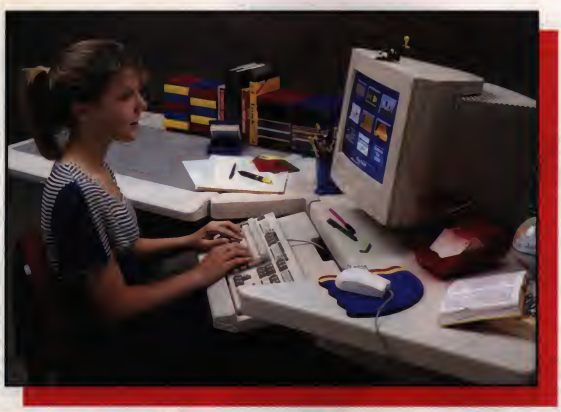
by Gail Dutton

For More Information:

EasyPhoto Reader
Storm Technology
(800) 275-5734
(415) 691-6600

Multimedia Video Grabber Plus
SIIG
(510) 657-8688

Snappy
Play
(800) 306-7529
(916) 851-0800



Kid Friendly Computer Accessories Designed in Fun Colors

Why can't kids have computer accessories too? For the family, the children's need to use a computer is a major motivating factor in purchasing a PC. Kids need a PC for doing homework, and to explore new learning activities.

Kids also need a place to store and protect their CD ROMs and disks. Why mix up their stuff with mom and dad's or worse with little brother Timmy? At SRW, we recognize the little needs of kids and have designed their accessories in fun, distinct colors and have even created fun animal stickers to add personality to each disk storage item. What can be more fun?

Kids Smart™ accessories are

- "Kid Friendly"—easy to open and close, safe, and rugged
- Separates children's software from parents and siblings software using fun colors
- Teaches responsibility by storing and protecting their own disks and CD ROMs
- A natural complement to the PC purchase and purchase of "Kidware" software.

KIDS SMART™

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Networking Your Home PCs

You don't have to be a rocket scientist to network your home computers. The computer know-how you've already gained can help you find a way to share files and printers among your computers. So whether you can afford a bottle rocket or a starship of a network, there are ways to make your files zoom from one system to another.

Inventory Your Needs

Suppose your friend Euston says to you, "Hey! Network cards are really cheap. A couple of those and some software, I bet we could network your PCs in no time." Well, maybe so, but after your genius friend makes your PCs look as if they're ready for a lunar excursion, you had better be comfortable with the results. Otherwise, your friend is going to get mighty tired of phone calls that start with, "Euston, we have a problem."

Network interface cards and local-area network (LAN) software can take your computers into the networking stratosphere, but this isn't the only solution, especially if terms such as IRQ, I/O ports, and upper-memory areas make you feel like you're breathing in a vacuum. Happily, there are solutions that can match your experience and pocketbook.

First, if you only want to share a printer, there are very inexpensive printer-sharing schemes (see "Creating Simple Printer-Sharing Schemes" in this issue). Likewise, if you're looking to sling files from one side of the room to the other, there are ways to do that without opening your PC.

It Takes Two

Take stock in your investment in computer equipment and software. If you're planning to link two computers together, you already may have the materials. Beginning with MS-DOS 6.0, IBM and Microsoft put the Interln programs called Interlnk.exe and Intersrv.exe in their DOS 6.x releases.

For this to work, you have to have either a serial port (i.e., COM1 or COM2) or a bidirectional printer port available. As the name implies, **bidirectional printer ports** let data flow in both directions. A relatively recent innovation appearing with IBM PS/2 computers, you won't find bidirectional printer ports as stock items on XT-class computers.

You also will need a serial cable or a bidirectional printer cable. The serial cable can be either a three-wire serial cable or a seven-wire null modem cable. The bidirectional printer cable is a 25-wire cable with male 25-pin connectors on either end. The standard printer cable won't work because it has a male 25-pin connector to the PC and a Centronics connector to the printer. If you have a choice, the parallel port connection will be faster. The seven-wire null modem serial cable can let you remotely install Interlnk.exe.

One computer will need MS-DOS 6.0 or newer, and the other can use MS-DOS 3.0 or newer. The INTERLNK and INTERSRV commands will help you set up one of the computers as a **file server** and the other as a **client**. You'll need about 16 kilobytes (KB) of memory to load Interlnk.exe on the client and 130KB to load Intersrv.exe on the server. (A file server is generally the biggest, fastest, and most powerful computer on a network; it has more storage space and processing power to run the network operating system. Clients are individual computers connected to the server to share its processing power and resources.)

Use a text editor such as Edit.exe for MS-DOS machines to place the line:

```
device=c:\dos\interlnk.exe
```

into the Config.sys file. By default, the Interlnk program assigns three drive letters to drives that may be available on the server. If, for example, your server has two diskette drives and two hard drives, add:

```
/drives:4
```

to the end of the INTERLNK command. To start the server, type **intersrv** at the command prompt.

With the client and server machine started, **interlnk** will display the drive letter assignments (see graphic on the next page).

The printer assignments may seem confusing initially, but this lets the client route printer output to printer ports on the server machine. This works well when the client is a laptop, and the server has available printer ports.

To change to the server's C: (hard) drive, you log on to the client's F: drive (which appears as a network drive). The redirection of drive letters is common to most PC-based networks. You can treat the redirected drive as if it belongs to the client machine, deleting, copying, or renaming files, and creating or removing directories. While the DOS 6.0 manuals claim you can run programs on the redirected drives, the access speed could make this impractical. You can run batch files to help automate file chores and run them from the server's drives.

Neither Interlnk.exe nor Interserv.exe works with Windows. If you work in Windows 3.1 or Windows for Workgroups 3.11 (WFW), you'll want to use other products. *LapLink for Windows*, by Traveling Software, supplies the cables and software to connect two systems for file transfers but doesn't really create a network among your computers. This type of software is known as remote control software.

Windows 95 Connection

Without spending a penny, Win95 users can add the Direct Cable Connection option to their Start menu, letting them perform the same chores performed by Interlnk. The Direct Cable Connection option works with Win95 features such as the Briefcase utility, which is used to update files between PCs.

To install the Direct Cable Connection option, you'll need a serial null modem cable (which matches the machines' serial connectors so they can communicate with each other) or a parallel cable. An Extended Capabilities Port (ECP) cable can be used with two machines with ECP parallel ports.

After you've connected both machines, open the Win95 Control Panel on both machines, and perform the following steps for both machines:

1. Select the Add/Remove Programs option.
2. Left-click the Windows Setup tab.
3. Double left-click the Communications entry on the Windows Setup page.
4. Left-click the Direct Cable Connection box.

Once this option is installed on both computers, use the Start menu to run this utility. You'll use the Direct Cable Connection Wizard to help you configure both machines. You'll be required to set up one computer as a host (server) computer and the other as a guest (client).

Before proceeding, connect both machines with the cable you've chosen. The Direct Cable Connection Wizard will help set up the correct port and tell you if the installation was successful.

Microsoft Interlnk Version 1.00

Port = LPT1
Drive letters redirected: 4 (D: through G:)
Printer ports redirected: 2 (LPT1: through LPT2:)

This Computer (Client)		Other Computer (Server)
D:	=	A:
E:	=	B:
F:	=	C: (170MB) MS-DOS 6.0
G:	=	D: (340MB) Drive D:
LPT1:	=	LPT2:
LPT2:	=	LPT3:

Here is a sample of the drive letter assignments after the installation of Interlnk. Note that the client's F: (network) drive is the same as the server's C: (hard) drive.

DuoNet Plus

Leunig Communications Inc. offers a networking solution for two computers called *DuoNet Plus* ($129), which includes two 10-foot cables. If you're already using WFW on both machines, you can access shared resources such as files, printers, fax/modems, and CD-ROM drives in the same way you would use them if they used network interface cards.

Windows 3.1 and DOS users can benefit from DuoNet Plus' software, which lets them transfer files and share a single printer.

Three Is Not A Crowd

If you want to connect more than two computers, you may want to use the same networking components used to set up large local-area networks (LANs). But you do have choices here, so you may not need to install additional adapter cards.

There are two commonly used networking models. In the **client/server model**, a computer is set aside as a server. It lets other computers use its resources for activities such as file and printer sharing. In the **peer-to-peer model**, all networked computers can share their resources, such as directories, printers, fax/modems, and even CD-ROM drives, with other computers on the network.

If all of your machines use WFW, Win95, or OS/2 Warp Connect, you can set up a peer-to-peer network without spending additional money on software.

If you don't want to add network adapter cards to your PCs, you can use a parallel port pocket network adapter, which is an external device. If you run either WFW or Win95, you can use Net44, another parallel port networking solution from L.C.I. (see the sidebar "Net44: A Magnum Solution").

If you use Windows 3.1 or DOS, you can network older equipment through a pocket network adapter designed for bidirectional printer ports. Designed originally for portable computers, pocket network adapters have been much more expensive than network adapter cards.

However, Addtron offers a relatively inexpensive **Ethernet** pocket network adapter for about $100. This adapter uses either coaxial (BNC) cables or telephone cables (RJ-45) to connect network stations like a daisy chain. The cheapest method is Thin Ethernet, also called 10Base2 or ThinNet, cabling. With Thin Ethernet cabling, you don't need to have a network hub (which can cost $200 or less). The disadvantage of this method, however, is that if you break the cable in any place, you bring the whole network down. (Ethernet is a networking protocol in which PCs listen for pauses in the digital conversation between computers before they begin to "speak.")

Under Thin Ethernet cabling, the computers are connected in a daisy chain using a BNC T-connector. The first and last computers must use a resistor called a **terminator** to mark the ends of the network. These terminators must be in place while the machines are running. A 25-foot BNC cable should cost less than $15. BNC T-connectors and terminators with grounds usually cost less than $9 each.

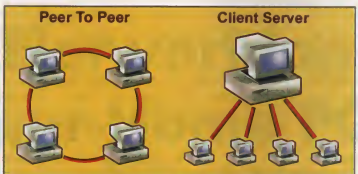
Pocket network adapters such as the Addtron product have a pass-through parallel port that still lets the printer port communicate with a printer. Don't expect it to print as snappily as when the parallel port services only a printer, though.

Opening The Can

Should cash be a concern and you're not afraid of installing a hard drive or an adapter card, you can consider using a network adapter card. This is not necessarily a straightforward undertaking. You should be comfortable with changing I/O ports and IRQ numbers before installing an adapter card.

Kingston Technology's EtheRx LC line of Ethernet adapters offers an inexpensive way to link your computers using Thin Ethernet connectors. The ISA version of this card costs less than $35.

EtheRx cards come with the QStart installation utility, which features mouse support and online help. QStart surveys a machine's hardware settings and suggests which IRQ and I/O port address to use. It then performs a four-step test to ensure the adapter is running properly.



In peer-to-peer networks, all PCs can act as client and server. In client/server networks, only one PC can be a server.

Personal NetWare & LANtastic

Once you've installed a network card, you'll need to choose LAN software. If you're using WFW, Win95, or OS/2 Warp Connect, you already have the software. If you're running DOS or Windows 3.1, you can choose either Novell's *Personal NetWare* or ArtiSoft's *LANtastic* software series.

Both of these network operating systems support hardware ranging from IBM PC-vintage to Pentium-class computers. Before installing these products, you should be thoroughly comfortable with editing your Config.sys, Autoexec.bat, and Windows .INI files. You also should be prepared to learn arcane terminology and concepts not found outside of networking.

Personal NetWare lets you set up a client/server or peer-to-peer network, or a combination of both. It also lets you share files, printers, and CD-ROM drives among two to 240 users. A five-user license should cost less than $270.

Artisoft *Simply LANtastic* is designed for small offices. Its ease of installation makes it a boon for first-time network users. Single-user Simply LANtastic software-only licenses should cost around $50 each. *LANtastic for OS/2* is available for around $100 for a single user. The full-fledged LANtastic 6.0 starter kit with two network cards and Thin Ethernet cabling should cost less than $250. ●

by Bill Hayes

Net44: A Magnum Solution

Net44 by Leunig Communications Inc. (L.C.I.) offers a simple but elegant way to network up to two printers and four computers running Windows for Workgroups 3.11 (WFW) or Windows 95. It does so by using standard printer cables to link computers and printers to a compact and smart junction box, which L.C.I. calls a network hub.

Inside the hub, a special **integrated circuit (IC)** chip quickly routes signals to computers and printers. These devices can be as far as 60 feet away from the network hub. The hub is powered by a small, external 9-volt D.C. transformer. All equipment is covered by a five-year limited warranty. Suggested manufacturer's retail price is $259.

Net44 ships with Network Device Interface Specification 3 (NDIS 3) drivers for WFW and Win95 on one diskette. L.C.I. claims the hardware can be connected in less than five minutes, making it ideal for home and small businesses. L.C.I. estimates that an average inexperienced user can connect and configure three computers and a laptop to Net44 in about two hours.

To set up Net44, determine if you have a sound card that may be using Interrupt Request address 7 (IRQ 7). If you have a SoundBlaster-compatible card, you can run its Windows-based configuration program or run the DOS-based Diagnose.exe program found in its directory. If IRQ 7 is in use, try IRQ 5, IRQ 10, or IRQ 11, which are usually available on most systems. Following the instructions in the sound card's manual, change the IRQ if needed.

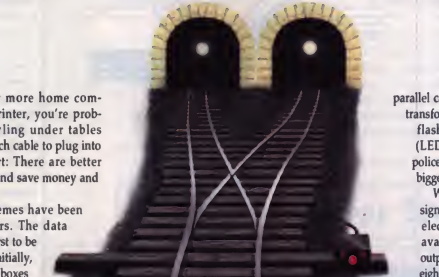
Next, turn off the computers to be networked. Disconnect parallel cables, connected printers, or other parallel port devices. If you're using a parallel port-connected CD-ROM drive or a tape drive with a pass-through parallel connector, you'll have to purchase an additional parallel port card for it, as Net44 needs sole use of a computer's first parallel port.

Connect parallel printer cables to the Net44 network hub and connect to the computers and printers. To ensure two-way communication, these cables must use all 25 pins. Some printer cables only use what is necessary for basic printer operation. Plug in the transformer, power up the computers, and install the NDIS 3 drivers.

On WFW, you'll install the software using the Network Setup icon in the Network program group. With Win95, you'll use the Control Panel's Network option. For the installation to be complete, you'll need your WFW or Win95 installation diskettes or CD-ROM.

So you don't take any wrong turns, we recommend carefully reading the Net44 manual's installation procedure. The review copy we received had an illustrated WFW network setup section and included a Win95 network setup insert. ●

Creating Simple Printer-Sharing Schemes



If you have two or more home computers sharing a printer, you're probably tired of crawling under tables trying to figure out which cable to plug into the printer. Take heart: There are better ways to share printers and save money and the knees of your jeans.

Printer-sharing schemes have been around for a few years. The data switch boxes were the first to be used for this purpose. Initially, mechanical data switch boxes contained a rotary switch that connected a single device, such as a printer, to two devices, such as computers. You also can reverse this arrangement and have one computer share two printers.

The "A" and "B" labels are stenciled by the switch positions, thus earning the name "A/B switch boxes." When you turn the switch from A to B, the switch breaks contact between a set of 25 contact points for Computer A, and the printer then makes contact with the set for Computer B. You can connect either serial or parallel cables to A/B switches.

These switches are excellent for connecting dot matrix printers to computers. However, some laser printer manufacturers, such as Hewlett-Packard, print warnings against using mechanical A/B switch boxes because they disrupt communications between the laser printer and the computer. If the switch is thrown to select another computer, the contact points break and make contact. The momentary voltage drop causes a logic error, requiring the laser printer to be reset.

To be fair to the A/B switch box manufacturers, it's possible to make a rotary switch safe for laser printers. Bravo Communications makes a surge-protected data switch certified as "LaserJet safe." Available in either two-input or four-input models, these cost less than $70.

Laser printer manufacturers usually recommend a data-switching device that uses electronic means rather than mechanical means to change connections between computers and their shared printer. These electronic data switches automatically scan a series of input ports and route a detected signal to a common output port, thus earning their name, "auto switches." They are available in either serial or parallel models.

Depending upon the model, auto switches can be powered through the attached serial or parallel cabling or through an external transformer. Some possess a row of flashing light-emitting diodes (LEDs), making them look like police scanners. Others are slightly bigger than cable connectors.

While the A/B switch was designed to accept only two inputs, electronic switches are usually available in two inputs to one output (two-to-one), four-to-one, or eight-to-one models. Small and inexpensive electronic A/B switches currently on the market range in cost from less than $10 for a manual model to $50 for an auto model.

Since cabling requirements vary, some boxes feature either nine or 25-pin cables, while others use the RJ-11 and RJ-45 modular cables used in telephone and networking wiring. RJ-45 cables look similar to the RJ-11 cables you use to plug your telephone or modem into a phone jack. They can connect up to four pairs of wires instead of the maximum of six wires found in RJ-11 connectors.

Sharing A Parallel Printer

Before buying anything, decide if you'll be communicating with your printer via serial or parallel ports. Serial data cabling can run longer distances than parallel cabling but isn't as quick and can be trickier to configure if you're using an electronic data switch. In most cases, the printer will be within 10 to 20 feet of the computers, so parallel cables can be used with confidence.

If you're trying to print from an upstairs bedroom to a parallel printer in the basement, there

are parallel printer port solutions that greatly extend the distance from computer to printer. The Interex Print Share System lets you use a printer from up to 1,200 feet away (see sidebar).

Look at your printer's connection to your computer. If the printer connector uses either a nine-pin or 25-pin male connector, it's a **serial printer**. If the printer connector has 36 contacts lining a rectangular area inside the connector, this is a **parallel printer**. Another dead giveaway is the wire "ears" on either side of the connector that hold the parallel cable in place. When in doubt, consult your printer manual because some printers have more than one interface type.

Once you know what kind of cabling you'll use, you can purchase the correct type of switch box for your needs. Assuming you're using parallel printer cabling, you'll need to buy a 25-pin male-to-male data switch box cable for each computer to be connected to your printer. Data switch box cables made by 3M can be purchased in either 6- or 10-foot lengths for less than $10.

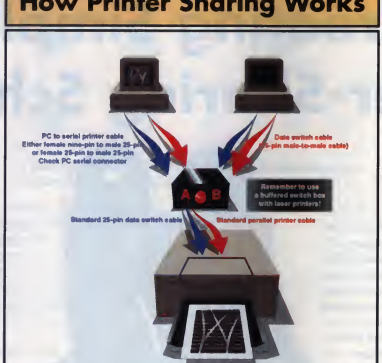
If someone gives you a 25-pin cable, remember that not all 25-pin cables use every pin. Serial cables have only six active wires found at pins 1, 2, 3, 4, 7, and 20. Make sure your 25-pin cable has all the pins connected. You can do this with an inexpensive ohmmeter or by making one with an old flashlight, duct tape, and some wire.

You then will need a single parallel printer cable to connect the switch box to the printer. Printer cables are available in 6- and 10-foot lengths and should cost less than $10. If you already have a printer cable of the desired length, you won't need to purchase one.

Regardless of the type of printer-sharing box you've purchased, follow these steps:

1. Use a small, flat-tip screwdriver to loosen and later tighten cable screws.
2. Turn off all computers, printers, and other peripherals to lessen the shock hazard to yourself and static electricity damage to your equipment.

How Printer Sharing Works



3. Since you'll be working with cabling that will conduct static electricity to the inside of your computers, touch a nickel to a grounded surface to eliminate any static charges.
4. Disconnect the printer from the computer. Remove the cable from the PC side while leaving it connected to the printer.
5. Put the switch box in the location where you expect to use it.
6. Connect the printer cable to the switch box output port and tighten the cable screws.
7. Connect the two 25-pin data switch cables to the A/B box, and tighten the screws.
8. Run the data switch cabling to the computers, then connect the cabling to the parallel ports, and tighten the cable screws.
9. Label the switch box so everyone knows which switch position goes to which computer.

If your switch box has a transformer, connect it to the box, and plug the transformer into a nearby surge protector. Bypassing the surge protector by plugging the transformer directly into a wall electrical outlet gives lightning an unobstructed path into your equipment. We know of one office where a lightning strike used an unprotected transformer to fry the auto switch box and then went through the printer-sharing cabling, damaging two computer motherboards.

If your printer-sharing device has a power switch, turn it on first, then the computers, and then the printer. Remember this sequence; turning a computer off or on while connected to a powered-up printer through an auto switch may cause a printer error.

If you're sharing a laser printer and are using either a mechanical switch box or a manually operated electronic switch box, change the switch selection from A to B. Check the laser printer's control panel for error messages. If none appear, move it from B to A, and check the control panel again for errors.

When there are error messages, reset the printer, or turn it off and on. Change the selector settings again to see if the error repeats itself. If you're using an inexpensive A/B box with a rotary switch, the error messages indicate that you should change to a different buffered switch that is "LaserJet approved."

Now install the drivers for your printer on both computers. If you're using Windows 95, you'll be asked if you want to print a sample page. Set the A/B switch to the correct position, and select Yes.

In MS-DOS, OS/2, or Windows, test the printer-sharing system by using a text editor or word processor. If you're using *WordPerfect*, use the Printer.tst file. The printer should correctly produce a properly formatted document. Then switch to B, and send a sample document to the printer.

Sharing A Serial Printer

If you're using serial cabling, prepare to perform a few more steps in the configuration process. You generally will be following the same procedure outlined above.

With a simple A/B switch as part of our example, we'll assume you want to print to a laser printer that has a serial interface. Since our A/B switch box has female 25-pin connectors, two changes in the cabling are required.

First, you will have to use female-to-male cables since PC serial ports use male connectors. These cables can be either serial cables with only nine pins active or data switch cables with all 25-pins active.

Check the serial ports on the printer and the computers. The computers will have either nine-pin or 25-pin male connectors. The female end of the cables must match the PC serial connectors. The printer has a female serial connector. Hewlett-Packard (HP) LaserJets and DeskJets use 25-pin female serial connectors.

For instance, if you have a nine-pin male serial connector on your computer and you want to connect to the 25-pin female serial port on your LaserJet 4, you should use a serial cable that matches the HP24542G serial cable. Likewise, if you have a 25-pin male serial connector on your computer, you should use a cable matching the HP17255D serial cable to hook up the LaserJet 4.

These HP serial cables have been used for a few years, going back at least as far as the LaserJet II. Odds are your serial printer can use these as well. Check its manual to make sure.

Secondly, these serial cables switch signals from one set of input pins to another, so you don't need to switch them back again. You can use a single 25-pin male-to-male data switch cable to connect the printer's serial port to your A/B switch.

Consult your printer manual for special instructions about your printer's serial communication settings. These settings may be changed either from a control panel, as with the LaserJets, or by changing DIP switch positions, as with the DeskJet 500. For most serial printers, including the LaserJet serial ports, you'll want to set the serial port's characters per second speed (baud rate) to 9600 baud.

You'll also want to make the proper **handshaking** settings for your computer. This lets your printer tell your computer when to send the information to ensure every bit of data is properly received. Most PCs use something called the DTR/DSR hardware flow control.

Signals that flow through a serial cable's Data Terminal Ready (DTR) and Data Set Ready (DSR) lines are used to determine when data will be transmitted to the receiving device. Consult your printer manual to find out the correct way to make this setting.

Next, check the printer manual to see if any additional serial settings must be made. You may have to change the stop bit and parity settings. These settings are usually "no parity" and "one stop bit." In the case of the DeskJet 500, only the parity setting can be changed.

Next, you need to add commands to each computer's Autoexec.bat file. You can use a text editor such as DOS EDIT. These lines let your serial port redirect the first logical printer port (LPT1) to the serial port. You'll be using two **mode** commands for these entries.

The first **mode** command:

```
mode com1:9600,n,8,1,p
```

sets the computer's first communications port to 9600 baud with no parity and eight-bit words with one stop bit. The "p" entry tells COM1 to keep trying to connect until the receiving device accepts the message.

If the printer's serial communication settings are different, you won't be able to talk to the printer, so make sure the mode entry matches the printer's serial port configuration.

The last **mode** command:

```
mode lpt1:=com1:
```

tells the system that all output destined for LPT1 should be directed to the first COM port instead. After editing the Autoexec.bat file, save your changes with ALT-F, *S*. When you've set up both computers, restart them, and test the printers as shown in the parallel printer section. ●

by Bill Hayes

Smart Printer Sharing

If you have computers scattered in your house, you should know that there is a better way to print than to lug the parallel printer from room to room.

The Interex 64 to 8 Print Share System by Interex Computer Products gives you a software-controlled printer sharing system for your MS-DOS, Windows 3.1, and Windows for Workgroups 3.11 (WFW) computers. This eliminates the need for a separate data switch box.

The Interex approach uses small transceivers for your printer and computers. The transceivers are connected using telephone-style cabling with RJ-11 telephone connectors, just like the ones on your home phones.

The RJ-11 cabling lets you put your printer in a central location and connect it to your computers. Unlike conventional parallel printer cables that must remain fairly short to deliver reliable results, the 64 to 8 Print Share System cables can extend as long as 1,200 feet.

When you want to have more than one printer on your printer-sharing network, you will have to use a small 9-volt transformer that plugs into the Interex print share transceiver for your printer. This transformer is included in the PRS-40 64 to 8 Print Share Starter Kit.

In our testing, the starter kit rendered speedy service under PC DOS 6.3, Windows, and WFW.

The starter kit should cost about $150, with add-on transceivers for printers or computers costing about $50 each. A manual printer selector switch is available for about $45 ○

Scanners Turn Documents Into Digital Data

It wasn't too long ago that the only way to transfer existing documents into a computer was to retype them. As usual, however, technology stepped in, and the scanner was born. Early **scanners**, devices that read documents or images and translate them into data computers understand, were slow, expensive, and unreliable when it came to translating the printed word into a word processor.

As technology improved, so did the scanner's ability to convert a larger variety of printed material. Today's scanners can take everything from text to color photographs and reliably and accurately convert it to digital images that you can easily modify to suit your needs. Scanners have become multipurpose tools with the capability of linking with a fax/modem for sending faxes. When used with your printer, a scanner even becomes a copier for small-quantity jobs.

Uses For Scanners

It's obvious that the prime use of a scanner is transferring hard copy to your computer without the task of retyping everything. As mentioned, faxing is one sure use of a scanner. Paper faxes can be scanned, rather than typed, into the PC and edited. But what do you fax? Usually you think only of documents, but what about three-dimensional objects? With a **flatbed** scanner, similar to a photocopier, you can scan in about anything. The entire object may not be in focus, but if you're trying to send an image of a new product container or similar item and don't have time to make a sketch, try scanning the actual item. One user we know scans his neckties and makes Windows wallpaper files out of the images.

Scanning also provides an excellent means of archiving data. In addition to old hard copy, you can handle invoices, receipts, and any other paper-based documents you acquire. Once documents are scanned in, you have the advantage of the scanner software's search engine for locating information that normally may be overlooked or not sought because of the difficulty in locating it.

Birthday and special event cards are another fun project. They might look best in color, but if you have only a **grayscale** printer, which prints in shades of gray, don't worry. They are still fun to do. Another use might be for numismatics to scan their coin collections and use the copy as a logo in documents. Your uses for a scanner are limited only by your own ingenuity, so experiment.

Inner Workings

Scanners, to do their job, must translate visual information into the digital data of the PC world. Computer memory is similar to a light switch in that it is either on or off. This two-state environment is called a **binary system** and uses binary arithmetic for storing and processing numbers. The decimal number system works on the number 10 as its base and uses the digits 0 through 9. The binary number system is based on the number 2 and uses the digits 0 and 1.

Scanners capture images by reflecting light off or through the original document into a strip of light cells called a **charge-coupled device** (CCD). The CCD converts the amount of light received into electric impulses varying in proportion to the intensity of light that strikes them. Since computers only understand integer (whole) numbers, the impulses are translated from an analog (variable) signal to digital form. The pictures then are stored as groups of integers.

To better understand how this process transforms the natural series of continuous tones from an original image into a series of integers, imagine slicing a picture into a mosaic of small tiles of equal size. Each of the tiles represents a picture element, more commonly called a **pixel**. Each pixel contains only a single color or shade of gray, and when you put pixels together, you see the appearance of a total image. Since each pixel is of a specific size and single color, as you move away from the image, the image appears smoother.

Your computer deals with color and its intensity in each pixel in one or more **bits** of data. The number of bits refers to the number of colors each pixel may contain, with one-bit, eight-bit, and 24-bit being the most common.

A one-bit file is naturally the most basic since each pixel has only one bit of data to deal with. In this instance, a bit has only one of two states—on or off or binary 0 (zero) or 1. This displays a pure, black-and-white image. One-bit images are also known as **bit maps** and look

similar to the familiar icons in Windows. (For more information on bit maps, see "Choosing A Graphics File Format" in this issue.)

The way to deal with shading or grayscale is to move from one-bit to eight-bit per pixel. An eight-bit pixel may contain 256 shades or intensities. This number (256) is reached by taking the two pixel states (0 or 1) to the eighth power. Usually you will find that most monochrome, eight-bit images duplicate photo-realism.

Color images start out with eight-bit pixels, but for photo-realistic work, you must consider 24-bit as the base. Many monitors won't even display 24-bit color, and your **graphics adapter**, a circuit board inside your PC, must be 24-bit, so be sure you have the right support equipment before looking at the high-end color scanners.

Your selection of a scanner is directly determined by your needs. Black-and-white scanners are less expensive and do an excellent job of reproducing black-and-white (and color) photographs. Color scanners continually are coming down in cost and give you a wider range of capabilities.

Resolution

Almost everyone is familiar with the concept of **resolution**. In simple terms, the higher (or more) resolution a system has, the sharper an image becomes. The reason for this is that as capacity (or resolution) increases, the amount of information it presents increases. Resolution is commonly measured in dots per inch (dpi) when dealing with printers, while monitors use pixels per inch (ppi). Scanners may use either unit to represent output resolution. Whether it is ppi or dpi, the higher the number, the higher the resolution and, thus, the better the image quality.

The type of image you want to scan and how you want to display the final product determine what the optimum scanning resolution is. As you move from text-based information to high-quality photographic art for a brochure, the resolution requirement increases.

High resolution does not come without a cost. Each step up in resolution increases the size of the scanned file. As colors are added and resolution increases, the number of pixels increases per image, and the information in each pixel increases. For example, an 8.5- x 11-inch, one-bit, black-and-white image takes up about 66 kilobytes (KB) at 75dpi, while the same image requires 1,054KB at 300dpi. Moving to color increases storage requirements tremendously. When comparing a 300dpi black-and-white image with a 24-bit, 300dpi color image, the file size soars to 25,245KB.

It's easy to see how you can quickly run out of hard drive space if you don't do a little planning before starting scanning projects. Don't use a higher resolution than necessary. You're wasting valuable hard drive space and not really gaining anything.

Higher resolutions also mean slower scan rates. The actual scan rate varies with each particular scanner, but a 10-second scan compared to a 50- or 60-second scan adds up pretty quickly when scanning a large number of documents.

Flatbed scanners such as MicroTek's ScanMaker E3 are hungry for desk space, but they offer the most versatility in types of objects you can scan.

Installation

Scanners use one of three interfaces to connect to your computer: serial port, parallel port, or SCSI. Two additional alternatives are a parallel-serial or parallel-SCSI adapter. Scanners using a parallel port (which is often used for printers) typically have an in-line, pass-through socket that lets you plug the scanner into the port and the printer into the scanner. Scanners using a serial port (often used for mice) require that you have a port open, so if you only have two ports and both are in use, you will need either to add another serial port or use an A/B switch box to have access to a single port.

Scanners using SCSI include the necessary card with the package. (The Small Computer System Interface [SCSI] lets several devices connect to the PC through one port.) You must have an open expansion slot for the SCSI card, which means opening up your computer. If you're uncomfortable with that thought, make sure you have someone who is competent install it for you.

Each of the interfaces has its plus sides. With the parallel and serial port, they are ease of installation and the ability to share the scanner with any computer. The SCSI interface is faster, but it limits you to the one computer where the SCSI card is installed.

Types Of Scanners

Scanners come in three basic formats: flatbed, sheetfed, and handheld. Each has its niche and works well within its confines. Following is a brief summary of each type of scanner with some pros and cons concerning each:

Flatbed scanners. This is the original scanner configuration and gets its name from its flat glass scanning area. Most flatbed scanners use a SCSI adapter, which means you'll have to install a card in your computer.

Typically, a flatbed is set up to scan a page at a time, but several scanners have an optional sheet-feed attachment for running multiple sheets. These sheetfeeders are expensive, so if you think you need this feature, be sure to check costs before deciding what to do.

Microtek Lab of California recently introduced its reliable ScanMaker E3, a 24-bit, color, single-pass flatbed scanner. Its street price is less than $400, which is extremely competitive in the color market.

Flatbed scanners have the advantage of being able to scan bound documents such as books and other bulky items such as neckties. (As a note, Logitech has a color, sheetfed scanner with a removable scanhead for scanning bulkier items.) Flatbed scanners typically reach into the

high-end market more than any other type, so if you are looking at scanners that cost several thousand dollars, they will be flatbeds.

Note that these scanners, which look similar to a copier, have the largest footprint. Be sure you have plenty of desk space to accommodate it.

Sheetfed scanners. Sheetfed scanners work as the name implies, with single sheets. When you insert a document, motorized rollers move the paper across the scanning head. Some sheetfed scanners, which usually cost about $300, have a paper-feed attachment to give you the capacity of handling up to 10 documents at a time.

Sheetfed scanners require very little space, and most will fit between your monitor and keyboard. Some even will fit in a briefcase so you can take it along on your next business trip. These scanners are handy and easily double as a fax unit without taking up the same amount of desk space.

Items to watch out for when using sheetfeds include how well they handle paper and where it exits. Since you hand feed the scanner a sheet at a time, it's easy to start the paper askew. How does the scanner handle this situation? Does it continue with the scan, or does it abort and let you start over? Also, check whether it has any type of self-aligning, paper-handling mechanism. If paper exits from a scanner at the front at the bottom, you will need to have adequate space to let the paper exit. The same holds true if the paper exits from the bottom toward the back.

One of our favorite sheetfed scanners is the PaperPortVx by Visioneer of Palo Alto, Calif. This serial connection scanner is fast and has excellent paper control with the paper exiting out and up from either the front or back. The software is a snap to use, and it worked equally well in our tests with Windows 95 and Windows 3.1x.

Handheld scanners. These scanners should not be considered a production tool. Handheld scanners such as Logitech's ScanMan are useful for their portability and low price. They generally plug into your computer's parallel port without any special adapters. The portability of this scanner makes it attractive for travelers with notebook computers.

Handheld scanners are less accurate than other scanners because of weaker light sources. It's often difficult to get a good scan because you have to manually move the scanning head at a fixed speed and in a straight line.

It's possible to scan areas larger than the scanner's surface and use software to "match" up the two images. Even at best, this can be tedious. If your scanning needs are minor and you only need a scanner now and then, consider a handheld model, with color units starting at less than $100. If you find a handheld scanner doesn't meet your needs, its low cost means you haven't lost much replacing it with a flatbed or sheetfed scanner.

Sheetfed scanners such as the PaperPortVx by Visioneer require little room, but paper may take a twisted path through the device.

Purchasing Checklist

You should do a little homework before deciding on a scanner. Following is a checklist to help you in your quest:

- Does my work consist more of text-based or image-based documents, or is it a combination of both?
- What is the largest physical size of paper I will need to scan?
- Do I need color or black-and-white capabilities?
- Do I need to scan bound documents?
- Where do I plan on putting my scanner—on my desk or against a wall?
- Can I edit the document once it is scanned?
- Do I need to use it with more than one computer?
- What software does the scanner include (OCR [Optical Character Recognition], editing, image management, etc.)?
- Does the software have any file compression routines for reducing the amount of disk space scanned files require?
- How easy is it to install the scanner on my computer?
- Does it interface with my other applications?

If you can think of any other items, include them on our list. If your major task is scanning text documents, be sure the OCR software included with the scanner is able to read a variety of fonts and understands formatting. Also, check that it integrates with your word processor and find out how many steps it takes to get the document from paper into your word processor.

As with all computer equipment, your work needs determine what you purchase. Buy the best scanner you can afford, and it should give you plenty of service. Every scanner manufacturer has its own proprietary feature that sets its products apart from the others. Even though some install easier than others, they all work well and do exactly what they are supposed to do—scan. ●

by Richard F. Huber

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(800) 231-7717

Microtek Lab Inc.
(800) 654-4160
(310) 297-5000

Visioneer
(800) 787-7007
(415) 812-6400

Introducing PageMaker 6.0 For Windows 95: Part I

Desktop publishing has been one of the few personal computing domains where Macintosh reigned supreme. But now we are experiencing a changing of the guard. It's the stuff of quiet revolutions, but it's a major coup nonetheless. Thanks to *Adobe PageMaker 6.0 for Windows 95*, computer users no longer need a Macintosh to produce professional-quality brochures, glossy publications, and company reports.

This latest version of the premier Windows desktop publisher shares more with its Macintosh counterpart than just a name. The two applications are virtually identical, aside from minor import and export filter differences. They even ship with the same user manual. In the world of high-end print communications, the king is dead . . . long live the king!

Support for Macintosh is still the operating standard at service bureaus and imaging centers, which long ago standardized on Macintosh and show no sign of switching. But the Mac's desktop publishing demise may be inevitable, given the popularity of Windows-based machines. Thanks to the Mac-like interface of Win95 and products such as PageMaker 6.0 for Windows, Win users now can remain totally PC-based. Mac enthusiasts might rather fight than switch, but if you're a PC user just embarking on the road to serious desktop publishing, there's no better reason to stick with a PC than PageMaker 6.0 for Windows.

A Rising Star

The first version of Aldus PageMaker for Windows debuted in January 1987. Version 5.0 arrived in April 1994. It was repackaged as an Adobe product and put on CD-ROM in March 1995. The latest PC edition represents the product's first major release for Windows since Adobe acquired Aldus in September 1994. It's also the first 32-bit version of PageMaker for Win95.

If you haven't migrated to Win95, you still can install PageMaker. It runs under the 16-bit Windows 3.1 using DLL (Dynamic Link Libraries) components. However, Windows 3.1 users will encounter several performance limitations. For example, PageMaker won't work on a Windows 3.1-based network server. It installs the 16-bit Table Editor (version 2.11) instead of the 32-bit Adobe Table if it detects Windows 3.1. Running PageMaker under Windows 3.1 may cause printing problems on non-PostScript output devices as far as TIFF clipping paths (i.e., masked curves) are concerned.

Loaded With Extras

You will realize as soon as you open the box that PageMaker is a high-end application packed with features. PageMaker is shipped on 16 high-density diskettes. Happily for end users, a CD-ROM version also is included. This CD-ROM offers more than just installation convenience; it delivers tight integration with Adobe's great line of products and even provides several Adobe applications at no extra charge.

In addition to PageMaker, you get:

- *Adobe Type Manager* (ATM) version 3.02, a font utility that produces great-looking screen fonts from PostScript language Type 1 printer font outlines. ATM lets you print Type 1 fonts on non-PostScript printers. It also lets you add Type 1 fonts to, or remove them from, your system.
- *Acrobat Reader* 2.1, an application for viewing, navigating, and printing any electronic document saved in Adobe's cross-platform Portable Document Format (PDF).
- *Adobe Acrobat Distiller* PE 2.1, a Personal (or limited) Edition of the application that converts PostScript language files into .PDF format. This edition works only with PageMaker-generated PostScript files.
- *Adobe Photoshop* LE 3.04, a "lite" or Limited Edition of Adobe's premier photo design and image-editing program.
- A collection of helpful technical and troubleshooting notes on a variety of topics.
- Tips from expert users.

- "Tryout" versions of Adobe Persuasion, Photoshop, Premiere, and Streamline. You cannot save files created with these special edition applications.

PageMaker's Deluxe CD-ROM contains other extras. For example, you get several high- and low-resolution Kodak Photo CD images to place in a PageMaker layout. There's a copy of Apple's *QuickTime for Windows* so you can view QuickTime movies (including those in the CD-ROM's interactive multimedia tour of new and enhanced PageMaker features). There's also a number of feature stories and how-to articles reprinted in .PDF format from earlier issues of *Adobe Magazine*. A bonus CD-ROM called *Adobe Type on Call* (version 4.02) is thrown in for good measure. This CD-ROM features more than 2,000 encrypted fonts for Macintosh, Windows, Silicon Graphics, and Sun computers. When you register the product, Adobe lets you unlock 220 typefaces from a selection of nearly 60 font families free of charge and throws in two Adobe Type utilities.

A complete PageMaker installation consumes more than 40 megabytes (MB) of hard drive space, but you can selectively install just the necessary components if you're short of space. Options include three spelling dictionaries (U.S. English, U.K. English, or French Canadian), dozens of file import and export filters, and an amazing variety of PostScript Printer Description (.PPD) files that provide the program with information about your printer (its printer-resident fonts, paper sizes, and resolution capabilities).

What's New?

Competition among software vendors plays out on PC screens through product releases featuring several enhancements and additions. "Our product now does [fill in the blank] faster, better, and with no increase in learning time," the marketing folks proclaim. Computernauts flock to these upgrades like flies to sugar, anticipating that more powerful options will be just what they need to increase productivity. PageMaker won't disappoint. It has been significantly enhanced, delivering more than 50 new features in addition to support for Win95.

The first thing you notice when the computer starts up is the program's modified interface. Designed to be more versatile, PageMaker's pull-down menus offer several new options while retaining basic ease of use. In addition, the standard Toolbox now contains 10 tools instead of eight, adding the Polygon tool to build multisided objects (see Figure 1) and a Zoom tool to magnify or reduce the view size of a particular area on-screen.

To adjust the view size of a selected screen area in PageMaker 5.0, you had to fiddle with a CTRL-Spacebar key combination. With PageMaker 6.0, you simply select the Zoom tool. When a plus sign displays in the center of this tool, a simple left-click magnifies an image view. When the tool displays a minus sign, left-clicking an object reduces the view size. You toggle between magnification and reduction modes by pressing the CTRL key when the tool is selected.

Figure 1: The standard Toolbox palette in *PageMaker* 6.0 now features 10 tools instead of eight, adding a Polygon tool for the design of multisided objects, plus a Zoom tool to magnify or reduce the view size of a particular area on-screen.

Double left-clicking the Polygon tool lets you determine how many sides every subsequent polygon shape will have. You also can adjust the degree to which a shape's vertices occupy the same point in the middle of the polygon (i.e., its star inset). To modify an existing polygon, simply select it with the mouse, double left-click the polygon tool, and adjust shape settings.

Other PageMaker additions increase the program's flexibility. PageMaker lets you work with up to 256 master pages per document. When you save a document, PageMaker remembers which palettes you had open and notes their sizes and positions on-screen. The next time you open a publication, palettes appear exactly as before. An automatic trapping option (go to Utilities, select Trapping Options) directs PageMaker to apply user-defined trapping values to page objects. You can change width values to control the amount of overlap that traps will have or adjust threshold settings to determine how often a trap is applied. You also can adjust the black attribute settings to control automatic overprinting of text, lines, and fills. PageMaker uses partial-object traps, trapping text objects separately from graphic objects according to the colors surrounding an object. While PageMaker won't trap objects abutting graduated fills or imported .EPS (encapsulated PostScript) graphics, it automatically keeps an undercolor away from PageMaker text or objects.

Users now can import Photo CD images directly into a PageMaker document. A special Kodak Photo CD Import Filter displays a thumbnail of the photo while providing several image-editing tools. You can sharpen image output, modify image dimensions, adjust resolution, rotate the picture, or flip it before actually bringing it into the document.

Several new features make PageMaker easier to use. For example, Recent Publications under the File menu keeps track of the last eight PageMaker documents opened. This feature is convenient when you're working on a project with several parts. You can set a selected object on Non-Printing (from the Element menu) when you want to leave personal reminders, production note messages for colleagues, or instructions for a service bureau. A nonprinting object can be seen but does not print. Its selection handles change to cyan to indicate nonprinting status (see Figure 2). The Align Objects setting (from the Arrange menu) makes it easy to align selected objects vertically or horizontally.

Some new commands offer increased control over screen objects. For example, Bring Forward and Send Backward (two commands added to the Arrange menu), make it easier to rearrange the stacking order of objects on a page. In earlier versions of PageMaker, when you moved an object, it was automatically positioned at the top of the stacking order. PageMaker's Send To Back command let you position the object at the bottom, while Send

To Front brought it all the way to the top. With the new Bring Forward command, you can now move an object just one position closer to the top of the stacking order. Similarly, Send Backward moves a selected object one layer closer to the bottom. Group and Ungroup commands (also in the Arrange menu) provide greater control over moving and editing multiple drawn objects, text, and graphic items. To modify an object in the group, simply hold down the CTRL key, and left-click the object. There's no need to ungroup them first.

Finally, the Arrange menu's Lock Position command ensures that selected page elements in a document don't change throughout the production process or from one version of this document to another. Locked items cannot be moved, resized, or deleted. Their degree of rotation or skewing angle also cannot be changed, but these objects can be edited. For example, you can apply a new color or fill color to a locked object and even copy a locked object, then paste it as an unlocked object elsewhere on a page.

Enhanced typographic controls in PageMaker offer greater **kerning** precision. (Kerning describes the space between typeset letters). Users can have type kern automatically as before or manually kern a selected character pair or range of text in increments. Kerning buttons on the Control palette provide point-and-click spacing controls when the palette is set to Character View. A Print Fit option (accessed by clicking the Paper button in the Print dialog box) lets you preview how well a layout fits the print area of the paper you intend to use before actually printing to a PostScript printer. (This option is not available for non-PostScript printers.)

A new masking feature (go to the Element menu, select Mask) lets you crop text, graphics, and drawn elements with shapes produced using the rectangle, ellipse, or polygon tools. Place the masking shape over the portion of the object you want to mask, make sure the mask shape and the object are both selected, then choose Mask. The effects of a mask can be undone with the Unmask command found under the Element menu.

One of the best improvements in PageMaker is the way it handles color. The product now offers support for Kodak's Precision Color Management System. This system allows for more accurate color definition, narrowing the quality gap between the

PageMaker 6.0 vs. Microsoft Publisher 3.0

Desktop publishers who routinely work with process colors and color images to produce camera-ready pages for catalogs or glossy magazines choose an $895 page layout application such as *PageMaker* because of its flexibility. The inventive PageMaker is designed to prepare complex typography, .EPS graphics, Photo CD, and scanned images for professional-quality output on image setters. But PageMaker 6.0 is a high-end application with an unquestionably steep learning curve. You must be prepared to spend a lot of time with the program if you hope to become an adept PageMaker user.

If you produce only occasional newsletters, fliers, business cards, brochures, and small reports with canned clip art, simple diagrams, and grayscale scans for output on the office laser printer, the high-end PageMaker may be overkill. Instead, consider *Microsoft Publisher 3.0 for Windows 95*. This entry-level desktop publisher packs a lot of page-layout power, but it sells for about $80 and includes features even the most inexperienced computer user will find appealing.

The program comes in two flavors, CD-ROM or diskette. Both versions cost about the same, but the CD-ROM edition is easier to install and brimming with content. With *Microsoft Publisher 3.0 CD Deluxe* (MPCD), you get 60 TrueType fonts, 150 publication borders, and more than 1,200 pieces of clip art. The diskette version contains about 120 borders, 150 pieces of clip art, and 22 TrueType fonts.

The best thing about MPCD is that it's easy to use. If you're already familiar with other Microsoft programs, Publisher will greet you like an old friend. It sports Microsoft's familiar Standard Toolbar. In addition, handy ToolTip labels pop up to identify a toolbar button that lies beneath the cursor.

The program features 12 on-screen tutorials that explain how to use tables, text styles, layers, outside printing services, and more. Sixteen guided PageWizard "design assistants" take you step-by-step through the creation of typical small business (and home) print jobs, including newsletters, fliers, brochures, forms, greeting cards, invitations, calendars, and résumés. Just use the mouse to point and click the type of publication you want to create, and the program does the rest. Publisher will ask you a series of questions about your intended publication. Answers you provide determine the publication's layout. A special Design Gallery offers ready-made creative design elements (such as styles for headlines, pull quotes, sidebars, and titles) that you can use to enhance the visual layout of your PageWizard projects. As you work, layout tips and feature explanations pop up on-screen to guide your way.

The latest version of Publisher for Windows 95 offers improved color handling, letting you compose documents with special color effects or print a color separation proof if you set up your publication for spot-color printing. It offers typographic controls for "fancy first letters" (drop caps) and character spacing (kerning), as well as several professional-quality tools. You can rotate any text, picture, or shape in user-defined degree increments, flip elements vertically or horizontally, and group items to manipulate them as a unit. Horizontal and vertical ruler guides are available whenever you have to align objects on a page.

Publisher's Table tool is an integrated program feature (rather than an external standalone application). When you edit document text or check spelling, you can do so in context without having to switch to a special Story Editor. The program automatically saves your work and even checks your publication layout to ensure there will be no printing errors. Sure, Microsoft Publisher is no Adobe PageMaker, but if it gets the work done quickly and produces quality publications, it may be the only desktop publisher you'll ever need.

colors that you see on-screen and the colors that output to a printer. PageMaker also offers support for expanded Pantone color libraries, making it possible to apply specialty tints (such as metallic, fluorescent, and pastel) to objects on a page. Users can take advantage of Pantone's high-fidelity Hexachrome color technology to print in more than four process colors. The Hexachrome library comes with more than 2,000 built-in shades. A new Color Palette pop-up menu lets you apply tints to lines and fill colors to rectangles, ellipses, and polygons.

Room To Move

Like previous editions, PageMaker has an architecture that can be extended, giving users the power to augment its capabilities by adding special "Plug-In" modules, found under the Utilities menu. The current version is shipped with 16 plug-ins. Some automate the steps it takes to perform certain tasks such as creating a drop cap (a large capital letter), adjusting PageMaker's tracking values table, or formatting text to add bullets, numbers, or special characters. Other plug-ins give the program new capabilities. For example, HTML Author converts text and graphics into HTML (Hypertext Markup Language) format for publishing on the Internet's World Wide Web. This editor doesn't support multiple columns, nonstandard graphic types, and lines that are not horizontal. However, it does let you publish simple documents for on-screen viewing, complete with title, headings, hypertext links, and in-line graphics, without having to learn HTML formatting codes.

Create Adobe .PDF (found under the File menu) isn't formally labeled a plug-in, but it has definite plug-in qualities. It extends PageMaker's capabilities by automatically converting a regular PageMaker file into an electronic document that can be viewed with formatting intact on any computer equipped with Adobe Acrobat Reader. Adobe perceives .PDF as an alternative to HTML, although current World Wide Web browsers generally do not read .PDF format directly. You also can create .PDF files if you want to share your documents with someone who does not have PageMaker.

Some Limitations

Thanks to support for multiple master pages, Kodak's Precision CMS, and Pantone's Hexachrome technology, PageMaker for Windows 95 is a stronger, more versatile desktop publisher than its predecessor. Features such as automatic trapping, improved kerning controls, enhanced object masking, and new commands in an Arrange menu provide compelling upgrade incentive. The application also is equipped with built-in indexing and book assembly options should you ever need them. However, PageMaker isn't perfect, and it's certainly not designed for novices.

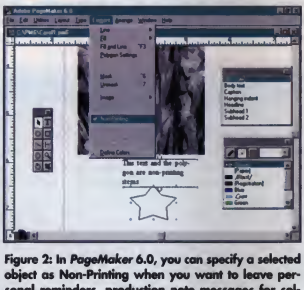


Figure 2: In *PageMaker* 6.0, you can specify a selected object as Non-Printing when you want to leave personal reminders, production note messages for colleagues, or instructions for a service bureau. Cyan handles on an object indicate its nonprinting status.

For example, its numerous dialog boxes still don't have Help buttons. This makes it difficult to obtain context-sensitive help when you need it. Similarly, the program provides neither pop-up labels for its numerous tool palettes nor status line descriptions for selected tools or commands. If you're unfamiliar with the name or function of a particular tool or button, you'll have to head for the printed User Guide. Unlike other Windows applications, PageMaker is still in the Dark Ages as far as some of the customization features you would expect. For example, it lacks *MS Word*-style toolbars that can be outfitted with buttons representing the PageMaker functions you use most often.

Like its Macintosh counterpart, PageMaker can wrap text around an object, but it cannot flow text into an irregular or geometric shape. There's no WYSIWYG (What You See Is What You Get) font displays available from either the Font menu or the Text Control palette. The new Adobe Table Editor remains a standalone application, requiring users to create a table outside of PageMaker, then import it into a PageMaker document. Importing a Photo CD image from the library that ships on the PageMaker CD-ROM may be more trouble than it's worth, since images are listed as "Img001.pcd" or "Img0014.pcd," and there are no printed thumbnails for reference. You can preview pictures using the Kodak PhotoCD Import Filter, but not very quickly.

PageMaker 6.0 has no "continuous" scroll function, making it impossible to go from one page to another in a publication simply by dragging the scroll bar. You move through a document one page at a time by clicking a page icon at the bottom of the screen. With this method, however, you cannot view the bottom of one page at the same time as the top of another. The program has no Automatic Save command, so you must remember to save often to avoid accidental loss of work.

Finally, this new version of PageMaker still has a separate story editor. You access this editor to check spelling or modify publication text with Find and Replace. The story editor is inconvenient because it doesn't allow for in-context or WYSIWYG editing. Moreover, it offers no support for endnotes or footnotes. Room for improvement notwithstanding, in the end it's up to users to decide whether PageMaker 6.0 for Windows 95 has enough clout to meet desktop publishing needs. ●

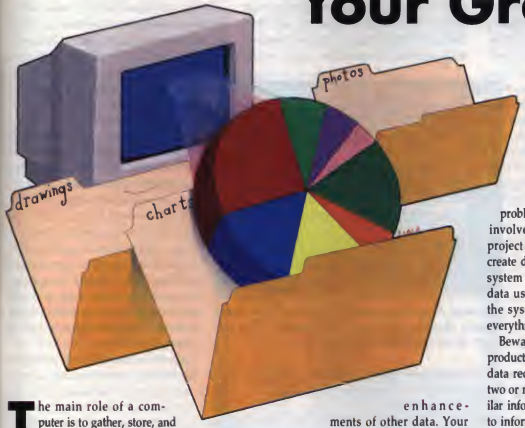
by Carol S. Holzberg, Ph.D.

For More Information:

PageMaker 6.0 for Windows 95
$895 (suggested retail); $149 upgrade
Adobe Systems Inc.
(800) 42-ADOBE (2-3623)
(415) 961-4400

Microsoft Publisher for Windows 95
$74.99 (CD-ROM version)
Microsoft Corp.
(800) 426-9400
(206) 882-8080

Organizing Your Graphics



The main role of a computer is to gather, store, and manipulate data. As technology moves ahead, the speed and capacity of computers continue to improve, making it easier to store an ever-increasing amount of data. Along with this growing technology come new methods of gathering a variety of different data, including graphics and images. This situation creates a double-edged sword. On one side, the ease of creating images and graphics is a great benefit, while on the other, keeping track of all this new data can create a nightmare of scattered files.

Graphics and images differ in how they are created. Graphics typically are representations of data, while images are most commonly real-world. Common graphical representations may be charts, such as pie or bar charts, and design drawings, while an image might be a scanned picture of a new product.

Whether files are known as images or graphics, they typically are extensions and enhancements of other data. Your computer business base may consist of one or more types of information in the form of text, spreadsheets, data, CAD (computer-aided design), or graphics. These types of files are usually the most dynamic on your system and require frequent updating.

With the ability to embed images into a wide range of document types, these enhancements have become an integral part of our work for both information presentation and information sharing.

No matter how many types of data you maintain, any type of document and its ancillary segments are all part of the circulatory system of an organization. And in order for the entire system to work properly, all of this data must be managed effectively.

Determining The Need

Whether you are a single, home-office user or an office with several employees, there are certain warning flags common to either situation that alert you to potential document-management problems. Remember that it is not always the amount of data but sometimes its diversity that causes problems.

Another document-management problem arises when the number of people involved in generating data for a specific project or goal increases. As more people create data, the need for a common naming system becomes apparent. Without a plan, data usually ends up scattered throughout the system with no one really sure where everything is.

Beware of one of the most common, nonproductive problems that occurs in an office: data redundancy. This problem arises when two or more people generate the same or similar information. Redundancy opens the door to informational errors, increased labor cost, and lost time.

Use the following self-test checklist to help you decide if you have any document-management problems.

- Do you spend more time looking for your data than using it?
- Do you have several types of important information or data, such as spreadsheets, graphics, or text, that haven't been integrated into your system?
- Do you find that the inability to locate any of the information you have created delays project completion or slows down your work process?
- Do you control the entire life cycle of critical documents or only part of it?
- Do you ever find that you don't always have the latest information available?
- Do you ever have to re-create or reorder information because you cannot locate existing information?

- Is any part of your important business data unorganized or not tracked?
- Can your data and information be accessed from other departments or individuals?

The impact of this checklist on your situation depends not on the number of items you can relate to but whether you can relate to any of them. Any single item we listed can cause a problem in your system's effectiveness. It's never too late to start an organizational plan to not only simplify your tasks but to increase efficiency with the final goal of reduced operating costs.

Implementing a document-management program helps to shorten the time from conception to completion of a project because of increased productivity individually or in each of the supporting departments.

A document-management program also improves quality by allowing greater control of your system's documents. Since related documents are controlled and distributed at the right time to the right people, it allows clear and easy access to critical information.

To The Rescue

Many scanners come packaged with their own image-management programs. Most of the scan-management programs set up a database filing system to give you the capability of indexing and searching your scanned images by titles and keywords. This system is great for all your newly scanned documents but doesn't do much for your existing files. This type of image management is useful for replacing microfiche but not particularly useful for supporting dynamic information.

A single-task, image-management system doesn't manage the document development process. So as you add new images and graphics, a system designed to work only with these entities starts breaking down when other documents such as spreadsheets and text are added in.

In many cases, a basic image-management program may be adequate for your needs. If your work is basically graphics-based and this is the only data you need to keep track of, the simple management packages included with your scanner might do just fine.

If you produce other dynamic documents, the scanner software won't fill your needs. You must look to alternative software packages specifically suited for managing a diverse information base. A full document-management system helps control the entire workflow process. We'll cover some of these programs later in this article.

While the data you're managing is unique to your situation, the actual workflow probably is similar to others in your industry. For example, if your work is project-related, several types of documents are involved, and often one document generates a need for another. An example of this might be a parts order.

***Harvard Mantage's* opening screen lets users impart thumbnails into the program, then set them up as direct links to image files.**

Starting with the original request, the paper trail might look similar to the following:

1. Bill of material
2. Purchase request
3. Purchase order
4. Receiver
5. Packing list
6. Inspection report
7. Accounts payable

Your system may vary from this, but the basic paperflow concept is here. You have control over your documents up to the receiver, but the since the packing list is created by the vendor, it falls out of the loop so you end up putting the paper copy in a file folder. Since the inspection report generally is filled out by hand, it ends up in the project file folder. The last task is to pay the bill. Since the invoice typically is mailed, the final marked copy is filed along with the rest of the project's records.

Even if your business doesn't have all of the above steps, you definitely have some of them, and you will end up keeping both computer and paper files.

What To Look For

You must determine what information is vital to your situation and how it is best organized and distributed. Simply sharing data is not a management system. Data distribution without control isn't using your computing system to its potential and opens the door to the problems listed in our checklist shown earlier.

Ideally, you should be able to make modifications to a document and have all its ancillary documents updated along with it. This works well with Windows OLE (Object Linking and Embedding), which takes care of the updates for you. This same capability is a handy tool when tied in with a document-management package.

A real estate office has different needs than a plumbing supply outlet, but when dealing with information, both need a way to "link" pertinent data. Using the real estate office as an example, a new home's variations in floor plans, exteriors, fixtures, etc., may be stored in an image database and the relevant files recalled for producing a personalized brochure for the potential home buyer. Once again, if you're dealing solely with images/graphics along with basically static data, a simpler image-management system should suffice.

Another reason for graphics management is continuity. Very often, a single image can be used in several different situations, and the difficulty in remembering a specific graphics file grows proportionately with the number of files on your system. This is why being able to open searches with keywords is important. A picture of an airplane might be used with any one of several presentations. For example, keywords might be travel, technology, modern, and so on.

The life cycle of a file is another consideration. Information either becomes outdated or obsolete. Generally, before either of these events fully occur, the information goes through a deterioration process that reduces the data's value. With a good management system in place, it's easy to review your data to make sure it's up-to-date and correct. On the flip side, this also gives you the capability of viewing previous versions of the current file in order to see the changes.

Choosing A Program

As mentioned, your business type determines how and what part of your information

needs to be managed for retrieval. There are certain criteria you should look for when buying a document-management program.

The following are two basic elements any document-management system must have:

- Information gathering and access—This is the database of information that contains text, spreadsheets, graphics, etc. From here, you can add and retrieve data.
- Linked modifications—When a document is modified, all of its components reflect the change.

Another important criterion is the number of different data types the program can recognize. Some programs only recognize and manage image and graphics files and don't recognize any other file formats, while others recognize formats from sources such as word processors and spreadsheets.

We looked at four image-management packages—two high-end packages (costing more than $900) and two low-end ones (less than $200). The selection of full-featured, image-management software is still a bit sparse, but we felt that there were certain features they all should have. We looked for the number and variety of file types the package recognized, the search engine for utilizing its database, the ability to link with other applications, overall ease of use, and built-in accessories such as file conversion. We found four products with image-management capabilities—Software Publishing's *Harvard Montage*, Quarterdeck's *HiJaak Graphics Suite 95*, Northpoint's *Compass Point*, and PaperClip Imaging Software's *PaperClip*.

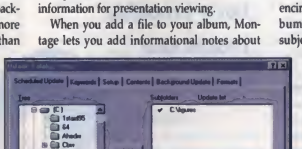
It was important that each program ran in the Windows 95 environment. (*NOTE: Several programs currently on the market claim to be Win95-compliant but are having difficulties. We didn't include these products in our review.*)

We first will look at the two lower-priced products.

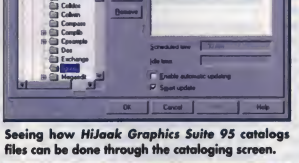
Montage. Software Publishing Corp. introduced Harvard Montage, which is available only in the Windows 3.x version, early in 1995. It works fine with Win95, however. This package offers tremendous flexibility in its image-management approach. Actually, this package goes beyond simple image management with its ability to import and set up thumbnails for a wide variety of file formats, including *Microsoft Word* and *Excel* files. These thumbnails link directly to the image, informational, or executable file they represent. Double-clicking the thumbnail opens the application pertinent to the representative file format. When adding a file directly dependent upon a particular application program such as a word processor, that file's application icon then displays as the icon with the file name at the bottom. If your scanner meets the popular TWAIN standard, you can scan your images directly into Montage for inclusion in your album.

The entire management concept of this package is based upon information being stored in three-ring binders that Montage calls "albums." When you open an album, you can access up to 65,000 thumbnail links. You can set up "subalbums" that contain slides and information for presentation viewing.

When you add a file to your album, Montage lets you add informational notes about the file. You can copy or move existing thumbnails to other albums, and they still maintain their original links, which brings us to another point. Typically, one of the major problems with management-type programs is their inability to deal with file relocation. When a file or directory changes drive location, the parent program loses track of where it went. To help solve that problem, Montage has a Relink command. Whenever Montage can't find the location of a file, it places an *X* over the thumbnail number. Selecting that thumbnail, then selecting Relink from the File menu opens a dialog box that lets you redirect the path. If the only change is a different drive letter and the directory structure stays the same, Montage automatically relinks the files.



Seeing how *HiJaak Graphics Suite 95* catalogs files can be done through the cataloging screen.



Here is *Compass Point*'s opening database window, which lets users input details about the characteristics of each stored image.

Once the thumbnail is in the album, you can establish the search criteria for future referencing. A dialog box prompts you for the album's keywords, thumbnail keyword, the subject, and description. The search engine allows for searches by Boolean operands (AND/NOT/OR), keywords, subjects, and marks. It's fast and easy to use.

Montage has tremendous possibilities and goes beyond your basic image-management tool, but the documentation is weak and doesn't begin to cover the potential of this program. Keep in mind that this program doesn't automatically track your documents. It is a document/image-management tool with a powerful interface. At less than $100, there is nothing out there that comes close to this program for sheer features and interface.

HiJaak Graphics Suite 95. This is a new product from a new acquisition. In September 1995, Quarterdeck (known for its memory manager *QEMM*) purchased Inset Systems Inc. You can tell by the name that this package runs only with Win95. The suite consists of Hijaak 95 Plus for displaying and converting and editing images, HiJaak 95 Capture for capturing screen shots, HiJaak Paint for displaying and enhancing raster (pixel-based) images, HiJaak 95 Scan for acquiring images from TWAIN-compatible hardware, and HiJaak Sketch for displaying, creating, and editing vector- (mathematically) based graphics. This gives you a complete set of graphics tools for managing and editing your files.

HiJaak manages your images through a cataloging database that maintains a record of all the graphics files on your system. HiJaak uses thumbnails for visual reference of the image. Each database file contains the image file's name, location, size, date, number of colors, number of pages, width, height, grayscale, type, image class, and keywords.

During installation, HiJaak adds an Update icon to the Taskbar and a HiJaak Catalog menu item in the Explorer's Find menu. The dialog box for configuring how the image catalog is set up resides in the Win95 Control Panel. We found that if you plan on using this system, you should create a shortcut to this icon on your Desktop. The Update icon displays either a red or green light depending upon whether the database is current. You can vary the updating intervals from none to constant. The manual warns you that the more frequent the update, the more computer resources HiJaak requires. We found this definitely to be true and recommend keeping this setting at a low profile.

HiJaak has a great set of image-editing tools and understands a wide variety of file formats. Its management system keeps track of every image residing on your system or on removable devices such as a CD-ROM. It doesn't have the same overall document-management capabilities that Montage has, but for someone who is looking for a versatile package, HiJaak might suit their needs. The current street price is less than $150.

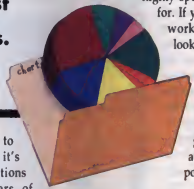
PaperClip. PaperClip Software Inc.'s PaperClip, one of our high-end products, is a full-blown, document/image-management tool that tracks, automatically updates, and maintains a database of all your documents. PaperClip is available in three configurations: the Professional Edition, the Network Edition, and the PaperClip Client/Server Edition.

The Professional Edition is a PC-based system for centrally managing all office documents that may include scanned images, faxes, E-mail, and other commonly used document formats. This edition also includes an Optical Character Recognition (OCR) module for scanning documents. PaperClip uses a system it calls **clipping** and **custom cabinet**. Clipping gives the user the capability of attaching PaperClip folders to applications and going directly to specific folders with a single keystroke. Custom cabinet works like a file cabinet containing drawers and folders accessible from any application via a hotkey.

The Network Edition of PaperClip is the same functionally as the Professional Edition with the addition of network support.

The PaperClip Client/Server (Network/SQL) Edition is designed for client/server environments. Similar to the network edition, it's more suited for situations where large numbers of people need to access the same information simultaneously. PaperClip supports optical storage, scanning, batch scanning, and indexing for working with large numbers of documents.

At less than $1,000, Compass Point is a bit pricey. What it does, it does well, but it probably should cost a little less.



This product is a powerful production tool that has as varied a capability as there are tasks. The current price is less than $1,000 for a single copy of the Professional Edition. The Network version cost depends upon the number of nodes. If your office can support this product, you can feel assured that it will support you. It's currently available in Windows 3.x with Win95 products due out soon.

Compass Point. Compass Point by Northpoint Software is the only true, image-only visual database management tool in our series. Designed for Windows 3.x, it works with Win95 without a hitch. Compass Point stores your information in what it calls **folios**. When first setting up a folio, you must give it a unique name. This then becomes your image's storage folder. You must log on to an image base before you can access it. Each image base is password-protected. Even though several people may have access to the same database, there are images that may not be available to them.

You can assign each image stored in Compass Point several descriptive areas for both searching on and use as future reference. Compass Point can understand only graphics files so you can't add any other type of application file to your folio. For its search engine, Compass Point uses Boolean operands for setting search criteria for fields and statements. Once established, you can save your criteria for future searches.

At just less than $1,000, Compass Point is a bit pricey. What it does, it does well, but it probably should cost a bit less. One point for Northpoint's corner, though, is the highly specialized niche this program is for. If you're running a company that works with a lot of presentations, look this package over. It lets you put a lot of information on-screen at one time.

Image and document management are important aspects of any system. As the system grows in size in both computers and users, this issue increases exponentially in importance. ●

by Richard F. Huber

For More Information:

Compass Point
Northpoint Software
(810) 643-0200

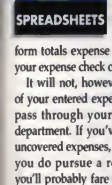
Harvard Montage
Software Publishing Corp.
(408) 537-3000

HiJaak Graphics Suite 95
Quarterdeck
(800) 354-3222
(310) 309-3700

PaperClip
PaperClip Software Inc.
(800) 929-3503
(201) 487-3503

Microsoft Excel 5.0

Using Borders & Patterns



If you've followed our Quick Study series over the last three months, you've created a complete expense report form using *Microsoft Excel*. After you've entered your expenses, this form totals expense categories and calculates your expense check on its own.

It will not, however, ensure the legitimacy of your entered expenses or guarantee a clean pass through your company's accounting department. If you've lost receipts or entered uncovered expenses, you may be out of luck. If you do pursue a reimbursement, though, you'll probably fare better if your expense report looks as nice as possible.

This month, in the last part of our expense report series, we'll explain how to use borders, colors, and patterns to dress up your expense report.

By using borders, patterns, and colors, you can create more attractive and effective spreadsheets with Excel. Just compare the illustration on this page with the way our expense report previously looked. By experimenting with these options, you can create an attractive, and very readable, expense form. Let's look at Excel's dress-up capabilities.

Borders

Excel offers a variety of border types and widths. To access your border choices, select the cells you want to format. Then open the Format menu, and choose Cells (Format, Cells). This brings up the Format Cells dialog box. Click the Border tab, which outlines your border options.

In the middle of the tab window, you can choose the border style you prefer. Your choices include various dotted and slashed lines, line thicknesses, and a double line. At the bottom of the Style area, you also can change a border's color. Clicking the scroll-down arrow on the Color bar provides a list of 56 colors from which you can choose.

On the left side of the tab window, you can choose to have the border outline the selected cells or run along any combination of left, right, top, or bottom edges.

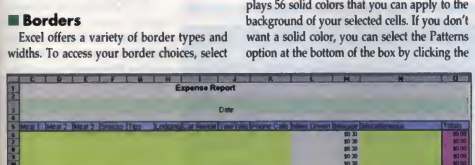
After making your selections, click OK.

Patterns & Colors

You also can apply patterns and color shading in specific cells. This can link cells together and highlight certain areas of the spreadsheet. To bring up your pattern and color choices, select the cells you want to format. Choose Format, Cells. In the resulting Format Cells dialog box, click the Patterns tab, which outlines your color and pattern options.

The Cell Shading box on the left side displays 56 solid colors that you can apply to the background of your selected cells. If you don't want a solid color, you can select the Patterns option at the bottom of the box by clicking the scroll-down arrow. This brings up an additional box with 56 colors and 18 patterns, including vertical, horizontal, and diagonal lines, dots, grids, and diamonds.

As you choose colors and patterns, you can see the effects you're creating in the Sample box, just to the right of the Cell Shading box. After making your selections, click OK.



By dressing up your expense report in *Excel*, you can make it easy for the accounting department to distinguish your expense categories and find your entries for grand totol and amount due.

Customizing Colors

If you want a color other than what is available on Excel's list, you can create your own colors. To do this, choose Tools, Options. In the resulting Options dialog box, select the Color tab.

The Color tab displays the colors Excel uses as Standard Colors, Chart Fills, Chart Lines, and Other Colors. To customize or change any of these colors, double-click the color with the mouse pointer or select the color, and click Modify. This brings up the Color Picker box.

In the Color Picker box, you can adjust the settings for your selected color. Do this by altering the color's hue, saturation, and luminosity as well as its mixture of red, green, and blue. When you have a color you like in the Color/Solid box, click OK. Then click OK in the Color tab. The new color will appear whenever you see your color options for this worksheet.

NOTE: Borders and patterns will stand out better in a spreadsheet if you hide the sheet's gridlines—the lines that border each cell. To hide these lines, choose Tools, Options. In the resulting Options dialog box, select the View tab. Then check that the Gridlines check box under Windows Options does not have an X in it. (If it does, click your mouse pointer in the box to make it disappear.) Then click OK.

Experiment with the various options of borders, colors, and patterns to see how they affect your report's appearance. It will stand out from other forms in the pile, and your accounting department will appreciate its readability. ●

by Lori Beckmann Johnson

Quicken Deluxe 5.0

Recording Transactions

5.0 FOR WIN

PERSONAL FINANCE

One of the reasons *Quicken* soared to the top of the financial software market faster than Pentium computers can load a game of *Doom* is because of its recognizable interface. You enter check payments on a screen that looks like a blank check. You balance your account on a screen that looks like a checkbook register. You schedule upcoming payments and jot notes on a screen that looks like a calendar.

Even though Quicken's process for entering information is familiar, you still must follow the procedure correctly and enter all of the necessary information to receive all of the program's benefits. We'll show you the basic steps involved in recording transactions, as well as your options for performing this task.

When entering new transactions, Quicken gives you two interface choices: a check blank or the checkbook register. The check blank interface will be most advantageous if you plan to print checks or if you are more comfortable with it; otherwise, we recommend using the register.

Check Blank

You can choose your interface at the Quicken HomeBase window. We'll discuss the check blank interface first. Click the Write Checks icon at the HomeBase. In the Write Checks window, you can enter a financial transaction almost as if you were writing a check by hand.

The Date, Pay To The Order Of, amount, and Memo lines are exactly the same as those on your personal check. To save typing strokes, you can click the button at the end of the Pay To The Order Of line and select a payee from the list, as long as you've previously had an entry for that particular payee. When you select a payee, the company's address is automatically entered on the check, which is beneficial if you print checks and use window envelopes.

On the Category line under the check, you can click the button to select a category for the transaction. You don't have to fill in a category, but you'll need one if you plan to use Quicken for tracking spending habits or budgeting.

You'll notice one main difference between your personal check and the Quicken check blank—no check numbers. Quicken automatically counts your checks sequentially if you print checks; if not, you'll have to manually enter the check numbers in the register.

You can customize the check blank interface. In the Write Checks window, click Options. You'll end up at the Check Options window.

NOTE: Depending upon how much you've used Quicken, you might see an Options window instead. If so, click Checks to access the Check Options window.

In the Checks section, you can customize the appearance of the check blank interface, such as the date format on the printed check, whether the check blank has artwork, and the addition of a second information/memo line. In the Miscellaneous section, you can set the date format for the check blank interface and whether Quicken warns you when the Category line is left blank. The QuickFill section lets you determine exactly which transaction information is automatically copied from one entry to another.

NOTE: Changes you make in the Miscellaneous and QuickFill sections will be made throughout the Quicken program.

Check Register

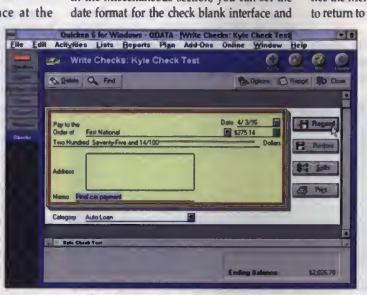
To use the Quicken checkbook register, click the Register icon at the HomeBase. You can click in any column to enter information for a new transaction, or press the TAB key to move between fields.

In the Payee column, you can click the button at the end of the line to see a list of all merchants previously entered into your database. Quicken automatically will enter information into the other columns after you select a merchant. In the Num column, you can enter the check number for the transaction or describe the type of transaction, such as an ATM withdrawal.

Customization is available in the check register window. If you'd like to see more transactions, you can click the 1-Line Display box at the bottom of the window. You'll have to sacrifice the Memo line, though. Click the box again to return to the original display.

Click Options to further customize the interface. In the Display section, you can change the look of the check register, including the ordering of its columns and its font and color scheme. The Miscellaneous and QuickFill sections are the same as mentioned previously.

The check register contains a helpful search feature. Click Find to enter the Quicken Find window. Type a particular word, payment amount, or merchant name on the Find line, and click Find to search the entire register for each occurrence. ●



Quicken's familiar interface gives new users an advantage in learning the program's many features.

by Kyle Schurman

Word Pro 96

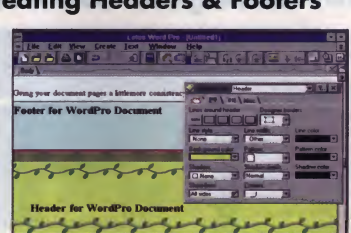
Creating Headers & Footers

If you create a multipage document with *Word Pro*, you'll want a consistent look among pages. Each page should appear as if it's part of the same document. Besides using the same typeface styles for body text and subheads, there are other things you can do to provide continuity. Adding headers and footers is one of them.

Headers and **footers** are areas in the top and bottom margins of a document, respectively. When you place contents inside the header or footer area, that information appears in the same area on succeeding pages—as long as those pages keep the same page format.

Creating a header or footer is easy. As you look at the work area in Word Pro, you can see header/footer areas at the tops and bottoms of your pages. To add a header or footer, click the mouse pointer in the header or footer area, which will become a box, and enter your information. This information automatically appears on subsequent pages.

NOTE: If you cannot see headers or footers in your workspace, they're probably hidden. To display them, open the View menu, and choose Show/Hide (View, Show/Hide). Then choose Headers & Footers.



With *Word Pro*, you can create consistent pages with headers and footers. You also can dress them up with borders, colors, and shading. Here we show a footer on one page and a header on the next.

Header/Footer Appearances

The margins, colors, and text flow of your headers and footers don't have to match that of the rest of your document. You can control these things through the Header and Footer Properties dialog boxes.

To access the Header Properties dialog box, place the insertion point in the header area, and click the right mouse button. From the resulting Shortcut menu, choose Header Properties to open the dialog box. To open the Footer Properties dialog box, place the cursor in the footer area, and click the right mouse button. Choose Footer Properties from the menu. The box will appear.

These Properties boxes have tabs that let you change different aspects of the headers and footers. We don't have space to go into a lot of detail, so we'll quickly look at a few things. If you experiment with the options and observe how they affect the appearance of your headers and footers, you'll quickly think of ways to use each option.

Size & Margins tab. As you would guess, the Size & Margins tab lets you change a header or footer's margins.

To move header contents down, you can set a top margin for a header in the Above Header: box. Likewise, to move footer contents up, you can set a bottom margin for the footer in the Below Footer: box. However, you should note that the top and bottom margins of headers and footers are calculated by Word Pro as a subset of the page's margins; if a header or footer's margins do not fit within the entire page's margins, Word Pro will not display the header or footer.

NOTE: If you don't want to worry about whether Word Pro has room for your header or footer, select the Adjust Header (or Footer) Height To Fit Contents option, and Word Pro will adjust the margins as needed.

Left and right header/footer margins are independent of the rest of the page and can be different from the left and right margins for the page. You set them through the Left: and Right: boxes. Additionally, you can separate header or footer contents from the main body of the document by specifying gutter space for the header or footer through the Header Gutter: and Footer Gutter: boxes.

Lines & Colors tab. Here you can dress up your header or footer with border effects. You can choose from a regular border, a rounded-corner border, a border with a shadow, or one of numerous "designer" borders. Just select the border style, the line style/width, the background color/pattern, and the shadow location/depth by clicking a graphic or making your choice from a drop-down list.

Columns tab. Using this tab, you can place your header or footer text in newspaper column format. If you want, you also can run a vertical line (called a **rule**) between your columns. To do so, just select the number of columns, the space you want between columns (in inches), and whether you want the columns to be **balanced** (the same length).

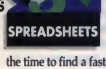
Misc. tab. The options on the Misc. tab let you alter the tab settings for your header and footer text, add or remove grids, and set the direction and flow of text.

Giving your document pages consistency and continuity is easy with Word Pro's header and footer features. By using them, pages in even the longest documents will look as if they belong together. ●

by Lori Beckmann Johnson

Quattro Pro 6.0

Creating Your Own Macros



In many ways, there's nothing more annoying than doing the same things over and over again. As if that's not enough, you often have to do it the hard way because you just don't have the time to find a faster way to do it.

For example, you might like to work with the same elements in every spreadsheet you create. If that element is a simple formatting task, such as capitalizing all of the words in a column, *Quattro Pro* can make your life a lot easier in just a few short seconds—and it can be done for every redundant task you perform.

Quattro Pro lets you save a task by first recording the steps required to accomplish it, then replaying it when you need it at a later time. The recording itself is called a **macro**. A macro is nothing more than an exact recording of something you do that can be replayed whenever you're in need of that recorded task.

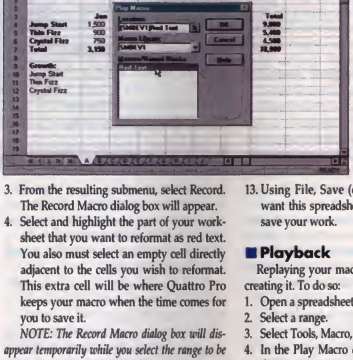
To show you how to record and play back a macro, we'll create one that formats a column of numbers so that they appear in red type.

NOTE: The figure shown on this page may look a bit different because it shows Quattro Pro running under Windows 95. Windows 3.1 users should not be concerned—you can use all of the steps outlined here.

Making The Recording

To begin, you need to open a spreadsheet using File, Open. Rather than using a critical spreadsheet of your own, we recommend either opening a new spreadsheet (File, New) or using one of the sample files that was installed with Quattro Pro. For the purposes of our tutorial, we'll work with one of the sample files.

1. Use File, Open to access the Open File dialog box. In the Directories: box, point and click into your QPW\SAMPLES directory. From the list of files, double-click Smbev1.wb2.
2. Once the file opens, open the Tools menu, and select Macro.



Every macro you create and name for a worksheet can be found in the Macros/Named Blocks list within the Play Macro dialog box.

3. From the resulting submenu, select Record. The Record Macro dialog box will appear.
4. Select and highlight the part of your worksheet that you want to reformat as red text. You also must select an empty cell directly adjacent to the cells you wish to reformat. This extra cell will be where Quattro Pro keeps your macro when the time comes for you to save it.

NOTE: The Record Macro dialog box will disappear temporarily while you select the range to be affected. When you have completed Step #4, the dialog box will reappear.

5. In the Record Macro dialog box, click OK to begin recording.
6. Click the Property button at the far right of Quattro Pro's button bar, then select Current Object from the resulting menu.
7. In the resulting Active Block dialog box, click Text Color. From the Color Palette, click the red square.
8. Click OK when finished.
9. Open the Tools menu, and select Macro, Stop Record.
10. Click the first cell in your selection. Open the Block menu, and select Names.
11. In the resulting Block Names dialog box, enter the name for your new macro in the Name: field. If you wish, the file name can be a short sentence.
12. Click Add to add your macro to the list of macros included in this worksheet, then click Close.
13. Using File, Save (or File, Save As if you want this spreadsheet under a new name), save your work.

Playback

Replaying your macro is even simpler than creating it. To do so:

1. Open a spreadsheet.
2. Select a range.
3. Select Tools, Macro, Play.
4. In the Play Macro dialog box, double-click the desired macro. All macro names appear on the Macros/Named Blocks list.

That's all there is to it! The contents of the cells you selected now will appear in red. From now on, whenever you apply this "Red Text" macro to a range of cells, Quattro Pro instantly will turn the characters red. You're not limited to simple formatting macros—your imagination is your only limitation. In fact, once you get started, you'll find it's easy to build an entire library of macros that can be saved to a particular worksheet or for use with any worksheet.

Macro creation certainly can be a daunting task. But if you follow the steps here, you'll get results much sooner than you ever dreamed when you're stuck doing those repetitive tasks. ●

by Robert Mullen

Microsoft Word 6.0

Creating A Data Source For Mail Merges

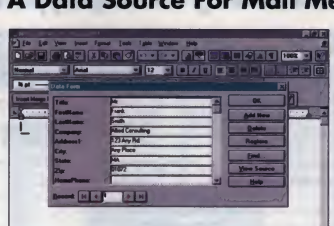
ersatile *Microsoft Word* handles documents with flair and panache, using specialized tools that make it a valuable office resource. Consider its mail merge facility. Word's Mail Merge Helper takes you step-by-step through the process of merging data with documents such as form letters, envelopes, or labels. Text and graphics in a "main" document remain the same, while facts and figures from the "data source" vary.

Word can merge sales data (such as amounts due), product information, personal notes, names, and addresses. Data may be obtained from a Word document or from another word processor, spreadsheet, or database. Data sources can be located on the same computer as Word, on a diskette, or in a file on a network.

A mail merge **data source** typically contains information arranged in table format, with individual records arranged in rows. Every column represents a different data field. For example, to send a personalized form letter notifying valued customers of a storewide sale or new product, each data source row should contain an individual's first name, last name, street address, city, state, ZIP code, and account information.

The uppermost row of a data source table holds column (field) names. Every field name must be unique and begin with a letter. Each name can have no more than 40 characters. Text in multiword headers can be separated by an underscore character but not a space.

You need not lay out information in table format for Word to treat it as data, although this arrangement is the easiest to read. As long as every data source "row" ends with a paragraph mark and a tab or comma separates column fields, Word easily can retrieve information. In fact, if a record has more than 31 fields, Word automatically uses tab or comma delimiters rather than table cells.



Assisted by *Microsoft Word*'s Mail Merge Helper, you construct a data source by designing a data form containing user-defined data fields, then enter your mail merge data in the appropriate fields.

Constructing A Data Source

It's easy to use an existing database or spreadsheet as a data source for mail merges. You may, however, find it easier to update, edit, delete, or otherwise manage data source contents if records are available as a Word document. You can create this data source manually, separating column fields with tabs and commas. If, however, you use commas to delimit data source fields and some of your source data contains commas, Word might treat it as two data fields rather than one. To ensure that Word recognizes such an entry as a single field, place the entry in quotes.

For users requiring more assistance, there's the Mail Merge Helper. This convenient assistant guides you through mail merge's three basic tasks: 1) creating a main document; 2) setting up a data source; and 3) merging data with the document. To construct, then edit, a data source for mail merge:

1. Choose Tools, Mail Merge, or click the Mail Merge Helper button on the Mail Merge toolbar (which will appear at the top of the screen if you're already working in a "Main Document").
2. Click Create to design a Main Document. Word presents a list of options, such as form letters, mailing labels, envelopes, and catalogs. Choose the one you intend to use.
3. When Word returns you to the Mail Merge Helper dialog box, click Get Data, then choose Create Data Source.
4. Mail Merge Helper then leads you through the process of creating a data source, complete with a "header row" containing unique field names for each data column. Word simplifies your work because it presents you with a list of common field names that you can select using the mouse.
5. To add a field name, enter it in the Field Name box. Word appends this name to the end of the list in the Field Names In Header Row box. To move a field name up or down this list, click the appropriate Move arrow. To edit a field name, highlight it in the Field Names In Header Row box, then click Remove Field Name. The name appears in the Field Name box ready for editing. To delete it, click Remove Field Name again. To search an existing database for records that match certain rules, click MS Query.
6. When you're finished, click OK. The Save Data Source dialog box appears, letting you save your data source file. Word then lets you edit the data source by adding new records in a "Data Form" containing the headers you've just selected.

After entering and saving data source information, you're ready to merge it with a document. We'll walk you through an actual mail merge in a future Word tutorial. ●

by Carol S. Holzberg, Ph.D.

WordPerfect 6.1

Creating & Using Hypertext Links

Why force readers to scan unnecessary material when they quickly can advance to a topic of interest with a mouse click? *WordPerfect*'s Hypertext function lets you assign actions to "hot spots" within a document that link to bookmarks or run macros. When a reader clicks the hot spot, it triggers the action assigned to it.

Before creating hypertext links, you must create the text, bookmarks, and macros that you want to link. Create your initial document, then create the text and bookmarks to which you will be jumping. These can be in the initial document or a separate one (use Insert, Bookmark, Create to create the bookmarks). If you are activating a macro, you need to create and test the appropriate macro.

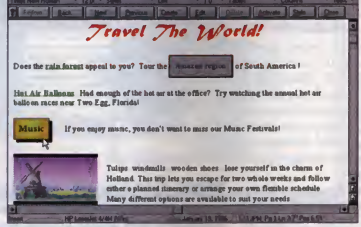
The Link

To create the link, open the document from which you want to jump. Highlight the text to be used as hypertext, then choose Tools, Hypertext. In the resulting Hypertext feature bar, click Create to open the Create Hypertext Link dialog box.

From here, you can go to a bookmark (within the same document or in another document) or run a macro. Click the appropriate drop-down lists to display document, bookmark, and macro names, or enter the name. Indicate whether the link will appear as text or a button. If you choose Text, your selected text becomes a jump word and will be boldfaced, underlined, and displayed in a different color (initially green). If you choose Button, the hypertext will be inserted into a button graphic. Choose OK to return to your document.

Repeat these steps until you're finished, then save your document.

When hypertext is active, clicking the jump word or button activates the link. When hypertext is inactive, clicking the mouse yields normal behavior, such as cursor positioning. Choose Tools, Hypertext to display the Hypertext feature bar. If the third button from the right on the feature bar says "Activate," click it to activate hypertext. If it says "Deactivate," hypertext is already active.



Hypertext links can be set up in a variety of ways using text and graphics.

With Hypertext active, you can click any link to activate it. When you click the text or button link, it will jump to the bookmark or run the macro that you previously indicated. After jumping to a hypertext link, you can return to the original hot spot by clicking Back in the Hypertext feature bar. Clicking Previous or Next will move to the previous or next hot spot.

Editing Hypertext

You can change the text or graphics shown in a hypertext hot spot. In our example, we have jump words, buttons with text, and a button containing a graphic. Before making any editing changes, make sure that hypertext is deactivated.

To change the text, move the cursor into the hot spot you want to edit, then select View, Reveal Codes. Edit the text, being careful not to delete the Hypertext codes.

Delete a hot spot by placing the cursor in a jump word or just before a hypertext button. Click Delete in the Hypertext feature bar. The text will remain but will lose its hypertext link.

Change the action or appearance of a hot spot by placing the cursor within the text of a jump word or just before a hypertext button. Click Edit in the Hypertext feature bar to open a dialog box similar to the one used when creating the link. Change the options as desired, and choose OK.

Jump words don't have to be identified with bold, green, underlined words. Choose Tools, Hypertext, and click Style in the Hypertext feature bar. This opens a dialog box from which you can change the appearance of the jump word. When you are done, choose OK to reformat all of the jump words within your document.

Buttons initially appear as black text within a gray box. We changed our Music button by right-clicking it and selecting Border/Fill from the QuickMenu. From the dialog box, we chose a Border Style of Shadow and a Fill Option of Circular Gradient with a yellow foreground and orange background. We added a windmill graphic to a button by right-clicking and choosing Feature Bar from the QuickMenu. From the feature bar, we clicked Size to specify button size and Position to define its position relative to the paragraph. Then we clicked Content, chose Filename, entered the name of a graphics file to display, and chose OK, Yes. Clicking Close closed the Graphics Box feature bar and redisplayed the Hypertext feature bar.

Hypertext links mean you don't have to present all of your material in one place, and they let readers focus on what interests them. For even more convenience, add a Hypertext button to your WordPerfect toolbar. ●

by Diane K. Walkowiak

Lotus 1-2-3 5.0

Backsolver Simplifies What-if Analysis

5.0 FOR WIN

SPREADSHEETS

We often have an idea of where we want to go but are unsure of how to get there. This applies not only to life but to the values contained in our *Lotus 1-2-3* worksheets. For instance, what if you want a particular result, such as a specific profit margin? By what amount would sales have to increase or expenses decrease to achieve that result? What if you only could afford a specific monthly mortgage payment? How do you calculate the amount you can borrow or the interest rate you need? Setting up a formula and then manually changing cell values until you reach the desired result can be very time-consuming. The good news is that manual manipulation is not necessary.

Lotus 1-2-3's Backsolver feature works backwards from the result of a formula to find the values of one or more variables in the formula. You supply the formula for which you want to get a specific result, the result you want, and the cell(s) you want changed to arrive at the result, and Backsolver does the rest.

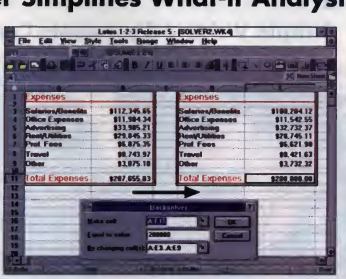
NOTE: The formula must depend directly or indirectly on the cells you want changed.

Note that Backsolver replaces the cell values with the new ones needed to achieve the desired result. Use Edit, Undo to restore the original values in the worksheet, or use Backsolver on a copy of the original worksheet so you can return to the initial values.

Changing Single Cells

An easy way to see Backsolver work is to have it change a single variable within a formula. For example, assume you are selling WhizzyWonkers for $1.25 each. You have a simple worksheet with the number of WhizzyWonkers sold in cell A4, the price in B4, and the total sales in C4. The formula in cell C4 is (A4*B4), and from the figures you have entered, it calculates that if you sell 20,650 items, you will have sales of $25,812.50.

What if you wanted to increase sales to $40,000? How many WhizzyWonkers would you have to sell? With your cursor in cell C4, choose Range, Analyze, Backsolver to open the Backsolver dialog box. Make the appropriate entries to tell it to make cell C4 equal to value 40,000 by changing cell A4 (the number sold). Click OK, and your worksheet will inform you that you need to sell 32,000 WhizzyWonkers.



Need to trim almost $8,000 in expenses? Enter your targeted amount, and let Backsolver recalculate your expenses to reach a total of $200,000. To exclude salaries and benefits, adjust your range in the Backsolver dialog box.

If you did not want to increase the number sold, you could increase the price instead. What would the price have to be to make $40,000 in sales? Choose Edit, Undo to return to the original values. With your cursor in cell C4, choose Range, Analyze, Backsolver, and make cell C4 equal to 40,000 by changing cell B4 (the price). Your worksheet will reflect a new price of $1.94.

Changing Multiple Cells

If you specify multiple cells to change, Backsolver will change the values of the cells proportionally. The value in each cell is changed by the same percentage of its original value.

To return to our WhizzyWonker example, assume you make cell C4 equal to 40,000 by changing cells A4 and B4. The quantity sold and the price would then be changed. Your worksheet would reveal that you need to sell 25,706 WhizzyWonkers at a price of $1.56.

The worksheet in our illustration uses the @SUM function to add up expenses for an imaginary company. The formula in cell B11 sums the values of cells B3..B9 and arrives at a total of $207,655.03. What if you wanted to decrease expenses so that they totaled $200,000? How would that affect the value of each item within the budget?

Remember that Backsolver replaces the values in your worksheet with the new ones to achieve your desired result. You should consider working with copies of the original worksheet so you can create multiple scenarios without losing your initial figures. In our example, we made a copy within the same worksheet in columns D and E.

With our cursor in cell E11, we chose Range, Analyze, Backsolver and instructed Lotus 1-2-3 to make cell E11 equal to 200,000 by changing cells E3..E9. As you can see in our illustration, each expense item was proportionally changed so that the expenses totaled $200,000.

Backsolver is a useful tool for what-if analysis. If you have a formula and know the specific result you want to achieve, the computer can fill in the particulars for you. Now if we just had a Universal Backsolver for all those other areas of our lives .... ●

by Diane K. Walkowiak

Improve Your Image

Simple Video Adjustments Can Enhance Your Windows Computing

Our "Q&A" column gets recurring questions about setting colors in Windows 3.1.

- **"How do I get my computer to allow the 256 colors some programs require, instead of only 16?"**
- **"How do I increase the resolution of my monitor?"**
- **"Do I need a new monitor or new video card?"**

Well, a simple color-configuration setup session might get those color-hungry programs running, answer those questions, and make your screen more pleasant to look at. It even might make your computer run faster.

Software sends images to your monitor through a **video card**, a circuit board inside your computer. Thus, many factors relating to your screen image depend on your card, monitor, and on certain Windows software settings. Video card and monitor specifications and color adjustment utilities involve several monitor image traits. A little terminology review is needed before we proceed.

Number of colors, color number, color-depth, color capability, color bits. Each of these terms refers to the greatest number of colors (or shades) that some device (your screen, printer, a graphics file) can display. It also may refer to the maximum color-depth capability of your video card, which in turn connects to a screen, and its software **device drivers**, software that lets PCs communicate with hardware. A black ink brochure on white paper could be called a "two-color display."

Normally, even on your color monitor, a word processor displays in black and white with simply colored icons or menus. If you counted colors, you'd probably find a maximum of 16, even if your computer is

currently set up for more colors. Business programs rarely use more than 16 colors, which works for a little pie charts or even cartoon drawing. The problem is that 16 colors are inadequate for representing photo-realistic images, as demonstrated by the two photos accompanying this article. Two-hundred fifty-six is about the minimum number of colors needed to pass as "normal." Images on informational CD-ROMs and clip-art collections, for example, usually are stored as, and should be displayed in, 256 colors. For critical work involving subtle shades, thousands or millions of colors may be needed. (A Kodachrome slide displays millions of colors at a resolution of about 3,000 x 3,000—more than most computers can handle.)

Computers work with numbers. For a one-color dot (**pixel**) to reach your computer's screen, it's represented by a number. If few colors exist, each shade's number can be short. 02 might be dark green; 12 could stand for bright red, etc. For millions of shades, a computer needs long numbers (such as 1,234,567) for each particular shade. Longer numbers have more digits or bits. Thus, 16-color images are called 4-bit color, 256-color are 8-bit color, and 16,777, 216-color are 24-bit.

Resolution. This refers to the number of "grains" on-screen. A resolution of 640 x 480 means that if you counted the tiny dots, or pixels, on-screen, you'd find 640 across a horizontal line and 480 vertically. A 20-inch monitor set at 640 x 480 naturally has bigger dots than a 14-inch monitor at the same resolution. So you'd need a higher resolution (maybe 1,024 x 768) on that 20-incher for it to seem as fine-grained as the 14-incher.

One aspect of resolution is often misunderstood. Setting higher resolution doesn't always give you the same-size images in finer detail; instead, it often displays the same image smaller. Why would anyone want that? Perhaps because you end up with more real estate (a bigger desktop), which means you could, for example, show a full page of text in your word processor and still have "screen space" left over to show a database.

Your maximum resolution is limited by your monitor's maximum capability (see "The Monitor Itself" sidebar), by your card's capability, and by the capabilities of a Windows video driver (see below). You can go no higher than the weakest link of this three-part chain.

The amount of **video RAM** (VRAM) in your video card sets an upper limit on resolution and color numbers. (All those colors and pixels have to be stored somewhere while on the screen. That storage place is RAM chips on the video card.) The more RAM on your card, the higher you can go. One to two megabytes (MB) of VRAM will cover most folks' needs.

When compared to a 16-color image, above, it's clear that 256 colors are needed for photo-realistic images.

Dot pitch. One monitor may look "sharper" than another even though they're both set to the same resolution and are the same size. This usually occurs because one has a finer **dot pitch**. Dot pitch, simply, is the distance between each tiny, colored dot. In this case, less is better. A .26 dot pitch gives a crisper image than a .30 dot pitch. You're stuck with your monitor's dot pitch, however, so we'll move on.

Refresh rate. Even a steady image on your monitor is really a series of images being regenerated ("refreshed") from top to bottom at least 60 times per second, which translates to a vertical **refresh rate** of 60Hz. Although 60Hz is too fast to let users consciously see the empty time between the images, you may perceive a subtle flickering. This slow, 60Hz refresh rate even may cause headaches in a few people. Often the major difference between a screen that's pleasant to look at and one that isn't is that one simply hasn't had its refresh rate set high enough. Generally, images become noticeably more pleasant to look at if the refresh rates exceeds 70Hz.

Less Is More, Sometimes

Most of us believe that more is better, so on many beginners' computers they, or a dealer, have set colors and resolution to the highest possible level. Yet you'll often do better with less. It's tough to distinguish a 256-color image from one in 64,000 or 16 million colors. Follow this resolution rule of thumb: Set a 14-inch monitor to 640 x 480, a 15-inch monitor to 800 x 600, and a 17-inch monitor to no more than 1,024 x 768. Higher resolutions often just slow down the display and make icons tiny.

Ironically, with refresh rates (where higher *is* better), we often find computers set at the *lowest* possible levels! This is because refresh rate is set on your video card, but it can be set no higher than your monitor's maximum refresh rate. Because sellers aren't sure what monitor you use, they play it safe and set the refresh slow. The result? You feel serious eyestrain after three hours at the monitor. Make sure you don't have a monitor that's cheated of its visual excellence by a video card set at a low refresh rate. (See below for setting refresh rates.)

Computer images are a "rob Peter to pay Paul" situation: Setting high color numbers, or resolution, slows your computer. Processing all those color and pixels takes time! The penalty is sometimes modest, but you can bet that running at 16 million colors and 1,280 x 1,024 resolution will cost speed. Try reducing your colors and resolution to gain speed. Also, consider that if you set your video card to run at high colors and resolutions, the refresh rate it can give is penalized, perhaps making the image flicker.

Of all the image settings, refresh rate can cause the most trouble. Unfortunately, it usually can't be set from inside Windows. The manuals of older cards sometimes explain how to set jumper switches on the card to, say, 72Hz. Even if you have jumpers, you usually don't have to use them because in your

computer or on a diskette that came with the card, you can find a utility with a name such as Sync.com, Refresh.exe, etc. Once you find it, you usually can discover how to use it by typing its name followed by **/?** or **/help**. Or you can just look on your video card's accompanying diskette for a program called INSTALL and run it from the DOS prompt.

Whether you use jumpers or software, try for at least 70Hz vertical at the resolution you use. For example, you might have to specify that for 640 x 480, 256 colors, the refresh is 90Hz and at 800 x 600, 256 colors, the refresh is 75Hz. A high refresh rate can make quite a difference in how pleasant your screen is to look at, but setting the refresh higher than you need can slow down image redraws.

Changing and resetting video drivers isn't hard, and several drivers often are already in your computer.

Handling Drivers

Setting your resolution and color numbers is easier. It's not your computer, but the combination of your Windows, Windows video driver, and your video card that either is or isn't capable of 256 (or more) colors. The key is usually in activating Windows video drivers. These files come with Windows itself, with your computer's video card, or later from a card's maker or Microsoft. Drivers are either standard, general-purpose Windows drivers that usually work with any VGA video card or custom drivers intended for use with a specific brand and model of card.

Drivers usually are in your WINDOWS\SYSTEM directory. Sometimes their file names are fairly obvious. Some standard drivers, for example, have names such as Vga.drv, Svga256.drv, and Supervga.drv. Some driver names are unintuitive and hard to match to the card they work with without looking at the manual. For example, Car1280.drv and Stlk.drv are drivers for certain cards from STB. At least one driver is already inside your computer and active in Windows, or Windows wouldn't even start. If you installed a video card, someone may have installed special drivers that came with it, or the drivers may be languishing on a diskette lost in a drawer.

Fortunately, you normally don't deal directly with the driver files and don't have to know their names. You use a variety of special utility programs to set colors and activate drivers. These utilities come with Windows itself, your computer, or video card. Changing and resetting video drivers isn't hard, and several drivers (for different numbers of colors and resolutions) often are already in your computer.

The best way to change drivers is usually to find, already installed in Windows, a special utility or icon that may have come specifically for controlling your video card. If it's installed, this utility will have an icon with a name like SetRes, WinSwitch, or InControl. It might be hiding inside a Program Manager group named after your video card (such as ATI Desktop) or your computer (Compaq Utilities). It even may appear as a nonstandard icon in Control Panel. The advantages of a card-specific utility are that it's easier to use, may offer nonstandard features, and, unlike the built-in Windows controls, might not force you to exit and restart Windows each time you change settings. If a custom utility isn't installed, look among the diskettes that came with your computer or card. If you can find one there, install it. (This is especially true of Windows 3.1. Windows 95 often does a decent job of changing with its built-in tools.)

If you don't find a custom video card control utility, change drivers by opening the Windows Setup icon in Program Manager's Main group. Click Options, then Change System Settings. You'll see a line labeled

The Monitor Itself

Oddly, your monitor normally isn't involved in adjusting numbers of colors or resolution, nor in the speed of your video display. (Generally, all monitors can display images faster than the computer or video card can generate images.)

DOS sets the upper limits your video card and Windows settings can "drive" the monitor to. The fine print of your monitor manual might report, say, a maximum resolution of 1,024 x 768 and a maximum vertical refresh rate of 75Hz. Actual settings are via your software and/or video card (see main article). If you push your monitor beyond its capabilities, it will produce either no image or a very distorted one, and it even can damage itself.

Note that **SuperVGA** just means a monitor can achieve at least 800 x 600 resolution, and "VESA refresh" means it can reach at least 72Hz at *some* resolutions. VGA monitors have no limits on number of colors. Even the cheapest VGA monitor can potentially display 16 million-shade images, though expensive monitors may more consistently match colors and be clearer and sharper.

Often when you reset your resolution or refresh rate, your monitor image becomes uncentered, slightly too big or too small, or curved on its edges. So *after* changing resolution in Windows, you'll often have to adjust monitor controls to recenter and resize your image. If there are no such controls on the front, look on the monitor's back. Top-of-the-line monitors have built-in, on-screen adjustment procedures for this, and once adjusted for a particular resolution, they will "remember" it even if you change between different resolutions. Cheaper monitors may have fewer centering/alignment controls, and they might end up with a picture with a half-inch of black screen space on the edges.

Display listing your active driver. To the box's right is a down arrow. Click it, and a list of other video drivers drops down. You may see one saying SuperVGA (640 x 480, 256 colors). That sets your screen resolution to the minimum 640 x 480 resolution and colors to 256.

Beware of several catches:

1. Not every driver listed works with your card. For example, there's Video-7 (800 x 600, 256 colors) that works only with cards from Video-7.
2. Even if a listed driver looks right, it might not be on your hard drive. If you select a listed but "uninstalled" driver, Windows asks you to insert its original installation diskettes so it can fetch the needed driver file.
3. The last driver on the drop-down list says "Other Display, Requires disk from OEM."

This means that if a special, custom-made driver came on a diskette with your video card (usually one did), then Windows would try adding that one to its list. A driver customized for your card is sometimes faster than a generic, general-purpose driver Windows provides, and it may activate special features of your card that Windows ignores. The downside is that sometimes custom drivers are less reliable and may cause General Protection Faults. If you can't find a 256-color driver listed on your drop-down list, nor from your card maker, call Microsoft (206/637-7098.)

At one time, Windows' own drivers couldn't go higher than 640 x 480 and 16 colors. But since Windows version 3.11 (2 years old) and Windows for Workgroups 3.11, Windows (and Win95) itself now comes with general-purpose, SuperVGA drivers at several resolutions and colors. (If your Windows 3.1 doesn't list these drivers, you can get them from Microsoft.) Even if you have custom drivers for your card, Windows' general-purpose drivers are great for diagnostics. If your system has problems and you suspect they're related to video, try the standard drivers to see if the problem goes away.

To access the Windows video drivers list, open your Main group, and open the Windows Setup icon. Click Options, then Change System Settings. In the dialog box called Change System Settings is a line labeled Display. Click the arrow to the right of that line, and scroll up or down to find a driver name, such as SuperVGA (800 x 600, 256 colors, large fonts). Select the one you want. If that driver has not been installed in your computer, Windows will ask you when you select the driver to "Insert the Windows disk #1 in drive A." Be sure you have your Windows diskettes available when trying this. If the driver has been previously installed, Windows offers the choice of activating the driver already there or updating it from a new diskette.

Though it's not as elegant, you also can use a DOS utility. Before Windows starts, type **cd **, then **cd windows**, then **setup** (each followed by the ENTER key.) That will start Windows' DOS setup, where video drivers also can be selected. If your drivers get fouled up, this DOS routine may be your only way to get back in. That means this DOS setup routine also is an emergency tool. Sometimes if you select a new video driver, your video card doesn't like it. You restart Windows, see the Windows logo, then nothing—a blank screen! In that case, reboot, get out to DOS (if necessary by holding F5 when "Starting MS-DOS" comes on-screen), run the DOS setup as above, and select plain VGA or SuperVGA. Although it's the least fancy driver, the 640 x 480, 16-color driver will sometimes work when all others fail.

A color, resolution, and refresh rate tune-up can be done is as little as 15 minutes and can spruce up your monitor image more than a new monitor—for free. Give it a try; you have nothing to lose but that eyestrain. ●

by Alexander Censor, M.S.

DOS Video: To Each His Own

One of the hidden virtues of Windows is that, although setting colors and resolutions takes a little work, once done it's done—for every Windows program you run. Each DOS program, however, whether run from Windows or without Windows, must set its own available numbers of colors and resolution or accept your hardware's default. Those default settings are usually the bare minimum (16 colors at 640 x 480). DOS programs that can, or must, have their own special settings each have their own ways of doing so, and each requires its own set of video drivers, either from the maker of the program or your video card's maker. Most video cards include diskettes with sets of high resolution drivers for a handful of popular DOS programs (such as DOS versions of *WordPerfect*, *Lotus 1-2-3*, and *AutoCAD*). For others, you must contact the program's maker. ○

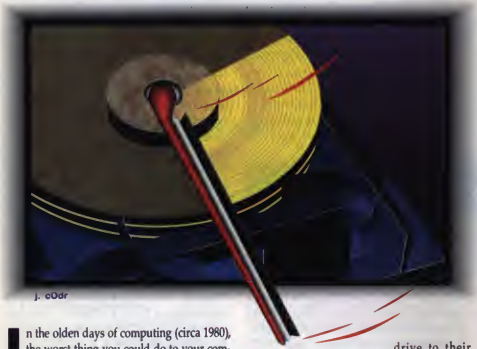
Win95: Hardly Refreshing

Although the same items (resolution, colors, etc.) need setting, generally Windows 95, unlike Windows 3.1 offers one-stop setting of colors and resolution. In Win95, it's all controlled completely from Control Panel (under the Display icon). If Win95 correctly identified your video card when it installed itself, it will let you easily reset colors and resolution without exiting and rebooting.

But Win95 has no *direct* way to set the all-important refresh rate. Very often, Win95 just thinks you have a standard VGA monitor and leaves your card's refresh rate set at an eye-straining, flickering, low refresh. If Win95 also correctly identified (or you correctly told it) the model of your monitor, it occasionally takes a stab at setting a decent refresh rate. But it rarely succeeds. So, unfortunately, with refresh rate you're often back to the old game of running a DOS utility from the video card maker, adding special refresh rate commands to your autoexec.bat file, or even setting [illegible] on your monitor.

Cards from Diamond and Number Nine are [illegible] exceptions. If you manually tell Win95 to look for and install special drivers from Diamond (already on your Win95 CD-ROM but not automatically installed), those drivers, and similar ones from Number Nine for its Motion-771, automatically will set your refresh rate. ●

Cleaning Disks With FORMAT



j. cOdr

In the olden days of computing (circa 1980), the worst thing you could do to your computer, short of taking a sledgehammer to it, was formatting your hard drive. Guru after guru warned not to type the dreaded FORMAT C: command, or your life would be forfeit to your god or boss. People even renamed or hid the FORMAT command so they couldn't execute it accidentally.

Most PC users are more sophisticated these days, and FORMAT is shielded in several layers of Windows prompts. But there are still times when you want to wipe your hard drive clean and start afresh. When are these times? Can FORMAT do the job for you, or do you need other software? What can you do to a drive besides formatting it? You'll find answers to those questions here.

First, let's define some basics. Format.com is a program that resides in your DOS directory. You can run it as a DOS command or through Windows. You can format a diskette (in your A: or B: drive) or one of the disks in your hard drive (usually C:). When you execute it, FORMAT accesses your drive and erases the data, restoring the disks in your drive to their virgin state. Or does it?

Actually, there are several ways to refresh your drive. When you normally use FORMAT, you're doing a **high-level**, **soft**, or **safe** format. This doesn't erase the data, but it erases and rewrites a disk area called the **header**. This header contains identifiers (or "pointers") that tell the system where the data is. Without these, the computer can't find the data even though it's still there. We'll discuss other format possibilities in more detail below.

Why would you want to reformat your hard drive? One good reason is if your C: drive starts acting up. Suppose either the SCANDISK or CHKDSK (check disk) command shows **cross-linked files**. A cross-link occurs because each file is really made up of data segments linked by pointers, like a chain. When an error switches one file's pointer to another file, it creates a cross-linked file. The first file's segments, no longer on the chain, become **lost clusters**.

When programs freeze or "crash," they can produce cross-linked files. Fortunately, SCANDISK usually can correct them. But if SCANDISK detects thousands of cross-linked files or lost clusters, says Rowan Trollope, senior software engineer at Symantec Corp., it's time to reformat.

Problems other than software glitches can clobber drives. Equipment failures, stray magnetism or electricity, or loose particles all can make them malfunction. Another possibility is a **virus** written by one of those "misguided geniuses." (Viruses are unwanted programs that attach themselves to files and reproduce with damaging effects.) Often, you won't know there's trouble until you boot your PC, and it comes back with "Not ready reading drive C. Abort, Retry, Fail?"

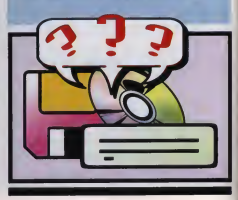
You also may want to format your drive if you're selling it. You don't want a stranger to get your registered software, business applications,

Disk Talk

When referring to a platter-shaped storage device, experts use the words *disk* and *drive* interchangeably. The one inside your computer, usually labeled C:, is called the hard disk or hard drive. The one you insert into your A: or B: slot is called a disk, diskette, floppy, floppy disk, or floppy diskette (even though the most popular diskette, the 3.5-inch version, doesn't flop).

Some people refer to the physical entity as a disk and the logical entity (a subdivision of the disk created by FDISK, such as D:) and the overall package of several disks as a drive. This article follows that convention.

Confusingly, the mechanism that holds and accesses a disk—either a hard drive or diskette—is called a disk drive. Also, a CD-ROM is also known as a disc or compact disc, but not a disk or a drive.



or other professional and personal data. A format can remove this concern. But note again that a high-level format erases only the header information on the disk, not the entire contents. A smart operator can recover the data using an unformat utility. We'll discuss how to prevent this in the following sections.

How To Format

The most important thing to remember when formatting is to back up your drive beforehand. Back up any file you don't want to lose because FORMAT is designed to "lose" them. If you have all the program diskettes, you won't have to back up your applications, but you should at least save every data file.

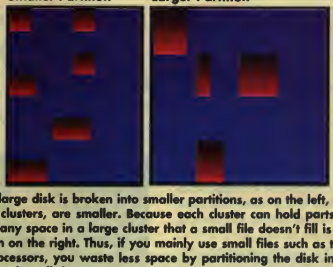
After backing up, reboot your PC with a write-protected **bootable diskette**. This is a diskette containing the DOS operating system with the tab on the underside in the "up" position. Booting your computer from this diskette ensures that a virus won't contaminate the FORMAT command.

FORMAT has several switches, or parameters, that tell it what to do. Most of these apply only to diskettes or are otherwise optional. (Type **format/?** for a listing and brief description of FORMAT's switches, or enter the DOS directory, and type **help** for descriptions of every DOS command.) Since FORMAT scans a disk for bad sectors, you can use the /Q switch if your disk is in good condition. The FORMAT/Q command does a quick format, deleting the disk's file allocation table and root directory (part of the header information mentioned earlier) but not examining the disk.

You also may want to use the /U switch. This tells FORMAT to do an **unconditional format**, as opposed to a high-level one. In an unconditional format, FORMAT not only wipes out the disk's header but also writes to every byte on the disk. This effectively (but not absolutely) renders it clean.

An unconditional format also means you can't restore the disk once you've erased it. With the standard format, you can restore the disk with the DOS UNFORMAT command. UNFORMAT scans the disk for its directories and files and re-creates the missing header. (Again, see DOS HELP for more information.) You can use UNFORMAT if, contrary to all warnings, you accidentally format your C: drive. You also can use it if your disk's header information becomes corrupt. You first must do a high-level format to blank the header, then an unformat to rebuild it from scratch.

Efficient Hard Drive Use



When a large disk is broken into smaller partitions, as on the left, the data slots, or clusters, are smaller. Because each cluster can hold parts of only one file, any space in a large cluster that a small file doesn't fill is wasted, as shown on the right. Thus, if you mainly use small files such as those for word processors, you waste less space by partitioning the disk into small sections and small clusters.

In Windows 95 terminology, the /Q switch is equivalent to a quick format and the /U switch to a full format. Also, the UNFORMAT command is part of DOS 6.22 but not DOS 7.0, the DOS that comes with Win95. If you've upgraded to Win95, as many users have, UNFORMAT will still work. But if you've bought a new PC with Win95 installed, it won't.

Clean Or Still Dirty?

We just said an unconditional format destroys your data irretrievably. But once again, this isn't completely true. The unconditional format writes a "zero" or null value to every byte. But even if you reset the magnetic particles this way, some magnetic residue may be left on the underlying material. Also, if the drive's read/write heads aren't aligned perfectly, some magnetism may overlap onto the surrounding particles. Either way, traces of the original data may remain.

Tony Alvarez, president of CPR Tools, uses a road-laying analogy to describe the process. Imagine your drive is a gravel road. Each piece of gravel is a magnetic particle on the drive's surface. If you write zeros to this drive, it's equivalent to laying tar over the road to smooth it. But unless a bulldozer flattens the gravel underneath, you still can read the bumps through the tar. In other words, Alvarez says, "There's some kind of a signature left. You amplify that signature, and you can in essence bring the signature back to where it was." Although it sounds vaguely science fictional, people are rumored to be working on this technology.

Unless your data is super-sensitive, this issue shouldn't worry you if you're selling your drive. But the U.S. government does worry, so it's developed a standard for eradicating data completely. It involves writing several alternating patterns over the same bytes. Once this is finished, the data is gone. Although DOS can't achieve this level of erasure, third-party software such as *Norton Utilities* can. See the sidebar "Third-party Tools" for more information.

Partitioning The Drive

Typically, a disk has only a single partition, which is indicated by a C: prompt. When you **partition** or repartition it, you're dividing it into smaller sections. You can split it into drives designated D:, E:, F:, and so forth.

When would you partition a disk into drives? One good time is when you're formatting it, since you've presumably backed up your data. Like a high-level format, partitioning rewrites part of the disk's header (the partition table), thus eliminating the data. (Eliminating access to it, that is. As with a

high-level format, the data is still there and can be recovered by special techniques.)

Another time to partition is when you buy a new hard drive. "Nine times out of 10, this is a raw drive," Alvarez says. "Usually the only thing a customer has to do is partition the drive and then format it."

Just as importantly, *why* would you partition a disk into more than one drive? True, most people don't bother; they settle for one huge partition. And when disks held 20 or 40 or 200 megabytes (MB) of data, this was more than sufficient.

But now disks are much larger. Capacities of 850MB or one gigabyte (GB) are common. This is a problem because the size of the disk affects the size of its data slots, or **clusters**. The larger the disk, the larger the clusters. Why does this matter? Remember we said that your computer breaks files into data segments. Each cluster contains one of these segments. If a cluster is in use, it can't hold any other data, including fractions of a segment. The result is a lot of half-filled clusters. "The typical slack space on a one gig drive," Trollope says, "is about 250MB of unusable space."

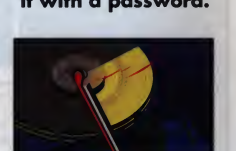
To make the problem more clear, Alvarez uses a postal analogy. Imagine a post office wall with narrow slots, he says. You only can put small pieces of data in each little slot. An envelope fits nicely in one slot, but a package has to be split among several slots.

"If you partition the disk to where it's just one big drive," Alvarez says, "then you have created a wall with big slots." Now one slot can hold a large data package—but it's much too big for a single envelope. Most of that slot, and the others like it, is wasted space. (See figure on previous page.)

If you have only small word processing files, you may want to partition a 1GB disk into two 500MB or even four 250MB drives. That way, you'll get the most out of your storage space. But if you're an artist, you may have only a few large graphics files. You're better off partitioning the disk into two drives: a 200MB drive for business applications and an 800MB one for the graphics.

Another reason to partition a disk is to use two different operating systems, such as Windows NT and Win95 or DOS. This way, you can have a dual-boot system that lets you run either one. When the operating systems have different file structures, as with Windows NT and Win95, segregating them is mandatory. Indeed, network operating systems such

If you share a PC with someone, you can hide your partition and its data, or secure it with a password.



as Novell NetWare and Windows NT create their own partitions automatically. Also, network servers typically have enormous disks, so network managers partition them according to function or workgroup. Sometimes the drives stretch all the way from C: to Z:.

Some people partition a disk to manage it better. If you share a PC with someone, you can hide your partition or drive and its data, or secure it with a password. Similarly, partitions can provide an overall scheme for organizing directories and files. By isolating system, application, and data files, you can safeguard them—for instance, when you want to test unstable software in one partition.

Using FDISK

We explained when and why you partition a disk, so now let's explain how. Use the DOS command FDISK. (***Warning: Use this only after you've backed up your data.***)

When you type **fdisk**, it presents several options, the first of which is to create a partition. Once you choose that, FDISK asks what kind of partition you want to make: a primary partition, an extended partition, or logical drives.

"If you are going to make one big partition out of your disk—in other words, all you want is a C: prompt—you create a primary partition," Alvarez says. "Then it asks you how big you want to make it. Do you want to use the entire disk?" If so, answer affirmatively, and FDISK does the job. As part of this, it reboots the system automatically and returns you to the same point.

But suppose you want to partition a 1GB disk into two. When FDISK asks if you want to make the primary partition the whole disk, say no. Tell it how big to make the primary—perhaps 200MB—and set it active. This is another FDISK option that will cause your PC to boot from this partition. Then, using the partition command again, create an extended partition. "Now it's going to ask you," Alvarez says, "do you want to use the rest of the disk? If . . . you just used 200MB, you now have 800MB available." Answer yes, and FDISK completes the task.

The program then informs you that you must create logical drives. You always have a C: drive, which corresponds to the primary partition. You must establish the other drives in the extended partition. To do this, continue the FDISK routine. The space on the disk is available to each drive in turn. You can allocate 800MB to D:, or 200MB to D: and the remaining 600MB to E:, and so on. When the space is used up, the work is done.

One command you can execute without harming your disk is FDISK /STATUS. This merely reports the disk's size and partitions. The /STATUS switch is useful when you're buying a hard drive from an unknown party. Alvarez tells how two customers both bought what they thought were 400MB drives from a dealer. Instead, the drives were 200MB compressed to 400MB. A quick look at FDISK revealed the trick.

Formatted At Last

The last detail is to format each partition. Alvarez explains: "The drive C: partition, your primary partition, you'll format with the /S switch command. Basically, that will format it and transfer the operating system." For the other partitions, use the standard FORMAT command.

Then install the rest of DOS (utilities such as DIR, COPY, and ERASE, as well as FORMAT and FDISK) in the primary partition. The installation program generates the system files known as Autoexec.bat and Config.sys and installs parts of DOS in high memory.

Then load Windows and your applications, and you've come full circle. Your disk is partitioned, formatted, and ready to go. ●

by Robert Schmidt

Third-party Tools

Third-party programs have features that ease the work of erasing, unformatting, or repartitioning a drive. They can prevent headaches, but be sure you understand what you're doing before using them. An alternative is to hire a consultant or repair person to do these chores for you.

Note also that you shouldn't use a Windows 3.x utility on a Windows 95 setup. Because the operating system has changed substantially, the results may be unpredictable.

Norton Utilities. Symantec's flagship program, *Norton Utilities*, comes in two flavors: version 8.0 for Windows 3.x and a version for Win95. Both offer some added formatting functionality.

Norton Utilities 8.0 has the WipeInfo command to protect confidential data. With it you can:

- Select the area to wipe—the entire disk, specific files, the unused portions of the disk, or the slack area of a file.
- Specify what value to write over the wipe area. The default is zero.
- Specify the number of times to write over the wipe area. The more times you write, the more complete the eradication.
- Select a wipe procedure that meets U.S. government security standards. This is the most foolproof erasure, but it takes most of a day for one of today's drives.

Norton Utilities for Windows 95 eliminated WipeInfo, but it still has a wipe option in its Speed Disk module. This purges the free space left on a drive after defragmenting it.

Both versions of Norton Utilities have the Image command, which copies the drive's header information to the end of the drive. If something should modify or delete the original information, you can use the copy to recover erased files or unformat the drive.

Both versions also come with an Unformat command, which works with Norton Image as well as DOS FORMAT information. Norton Utilities includes other tools such as Norton Disk Doctor, DiskEdit, and UnErase, making it the utility package of choice for Win95. (As noted, drive utilities and antivirus products not designed for Win95 probably won't work properly.)

CPR 3.0 Data Recovery Software. Made by CPR Tools Inc., this program is billed as a "powerful sector manipulation tool." Intended for advanced users, *CPR* lets you find, read, write, and copy any portion of a drive. With it, you can test a drive thoroughly or clone it in a disaster.

By letting you access individual bytes, CPR gives you unparalleled control over a drive and its contents. That's why it's used by professionals in the data recovery industry, computer repair shops and suppliers, and police and Defense Department agencies.

PartitionMagic. Power-Quest's *PartitionMagic* lets you perform the same partitioning functions as FDISK but without the risk or hassle. As its documentation puts it, "Not only can you add new partitions to your hard disk, but you can shrink, expand, and move existing partitions in minutes—without destroying data."

PartitionMagic makes the process easy with visual representations of your partitions and sliding bars to resize them. You don't have to go through the tedious steps of backing up your drive, deleting the old partition (thereby expunging the data), creating a new partition, formatting the partition, re-installing the operating system, and restoring your files.

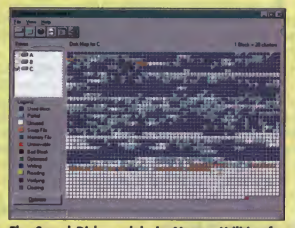
For those without the time or ability to back up a large drive, this may be the only way to partition it. Recall that without maintenance as much as one quarter of a 1GB drive may be unusable, which means $100 or more worth of wasted space. ○

For More Information:

CPR 3.0 Data Recovery Software
CPR Tools Inc.
(800) 274-3785, (407) 793-9455

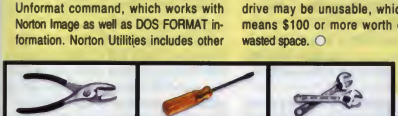
Norton Utilities 8.0
Norton Utilities for Windows 95
Symantec Corp.
(800) 441-7234, (408) 253-9600

PartitionMagic 2.0
PowerQuest Corp.
(800) 379-2566, (801) 226-8977

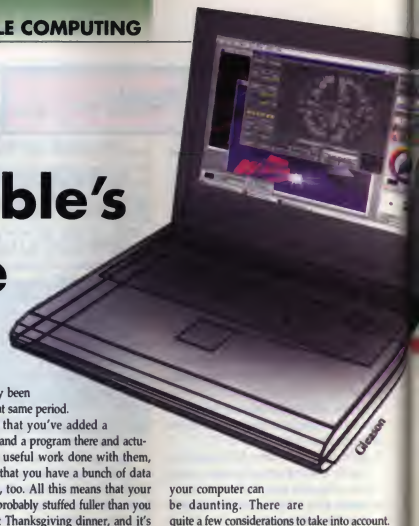


The Speed Disk module in *Norton Utilities for Windows 95* lets you wipe the free space left after defragmenting.

***PartitionMagic's* colorful graphic interface makes adjusting disk partitions easy.**



Upgrading Your Portable's Hard Drive



You've had that portable for a year now, and as your skills have grown, so have your requirements. You've added new programs, upgraded some existing ones, and started to notice how much faster your new desktop computer is than your "take-along." What can you do about it?

Depending on the make and model of your computer, the answer ranges from "just a few things" to "how much money have you got?" Most late-model portables have a host of options available to make them almost as brawny as their desktop cousins. In this article, we'll tell you how to upgrade your portable's hard drive.

Making It Bigger

One of the most amazing things in an industry filled with amazing things is the growth in hard drive capacities. Just five years ago, an 80 megabyte (MB) hard drive was a "jumbo," but most people only had 40MB drives or less. Two years ago, 230MB drives were the jumbos, and most of us squeezed by with 120MB. Today's standards are quite a bit loftier than that. The jumbo drive stores a staggering 1.6 billion bytes (gigabytes) of information, and the masses (most of us) just make do with dinky 540MB drives. That growth in capacity almost has been matched by corresponding decreases in price, especially when you consider the cost per individual megabyte of storage.

At the same time, the size of the programs you're likely to use has been growing—a lot. That word processing program you bought version 1 of four years ago took up only a few megabytes of storage. Imagine your surprise when version 6 arrives in the mail, and the box says it'll take 10 times as much. Of course, you haven't exactly been inactive for that same period. The odds are that you've added a program here and a program there and actually got some useful work done with them, which means that you have a bunch of data files out there, too. All this means that your hard drive is probably stuffed fuller than you were after last Thanksgiving dinner, and it's time to think about a hard drive upgrade.

Before you reach for your wallet, check one thing. Are you using a disk compression program on that hard drive? If you're not, you could have 50% or more of additional storage space for the low, low cost of . . . nothing! If you're using MS-DOS 6.22 or newer, you already have a perfectly serviceable disk compression tool, called DRVSPACE, built right into the operating system.

One word of warning: If you're using a version of DOS that's older than 6.22, DON'T mess with the disk compression program built into the operating system. It has problems, which is why 6.22 was developed in the first place. Either purchase a third-party compression program such as Stac Electronics' *Stacker* or upgrade your DOS to version 6.22.

If you already use a compression utility and you're still running out of space, it's time to think about purchasing a larger hard drive. Depending upon your computer's make and model, you'll have a few options with this upgrade as well.

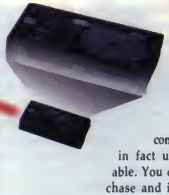
This is one upgrade in which the physical part is relatively easy (and safe), but the setup and purchase of an appropriate hard drive for your computer can be daunting. There are quite a few considerations to take into account.

First, which drive types is your portable compatible with? Some older laptops don't know about the later, larger hard drives available, and there's nothing built into the system Setup program that will tell you about them. You can get around this with a special program called a **BIOS** extender, but it's a pain. (The Basic Input/Output System [BIOS] is a special chip that, working with another chip called the CMOS RAM [Complementary Metal-Oxide Semiconductor Random-Access Memory], carries information about how the laptop is configured.)

Second, what is the physical size of the drive? Is it a 3.5-inch drive, a 2.5-inch model, or one of the super-small, 1.8-inch models? And last, but certainly not least, does the drive use a nonstandard connector and cable that you must purchase from the manufacturer and may not be able to find any longer?

That last type poses a sticky problem. They're out there, and you may not know which type you have until it's too late. Compaq's LTE 286 is one example. Drives made by Conner Peripherals for this computer use a totally nonstandard connector, and even the original drives aren't available

anymore. IBM's ThinkPad 700 and 720 (but not the 701s) are another example. These computers use MicroChannel instead of the industry-standard IDE (Integrated Device Electronics, in which controlling electronics are on the hard drive itself), and regular drives just won't work. But let's put all that aside and assume your



computer is in fact upgradeable. You can purchase and install a new hard drive that will fit, connect, and be recognized. How do you do it?

The luckiest among us have a removable hard drive in a modular carrier that plugs right into the side of the computer. Owners of IBM, NEC, Dell, and a few other brand names are in this fortunate category. Why is it fortunate? Because you can add another hard drive by simply sliding the old one out and pushing the new one in. You even could keep both hard drives, put the most commonly used applications on one and the less common stuff on the other, and trade them back and forth when you need to.

The downside to this is that your options for actually purchasing that second hard drive are pretty limited. You can go back to the manufacturers and pay their often-inflated prices for the upgrade package, or you can hunt for a third-party manufacturer. Unless you have one of the "big five" (IBM, Compaq, Toshiba, Epson, or NEC), the odds that you'll find a third-party manufacturer are small. One company that can help you with this is the Road Warrior Outpost, which specializes in upgrades and enhancements for portables. You can reach them at (800) 274-4277, or if you have Internet access, there's lots of good information at http://www.warrior.com.

What if there isn't a package available for your computer? If the moon, sun, and stars all align properly (in other words, the portable supports new drive types, uses a standard interface, and you can locate an appropriate drive), you still can replace the existing hard drive yourself.

The Upgrade

First, make absolutely certain you have your original DOS diskettes. You'll need them to install the operating system on your new hard drive once you have it in place. Second, you'll need to make a complete backup of the existing hard drive, so get several blank, preformatted diskettes. Using DOS' BACKUP, make a copy of the entire hard drive onto those preformatted diskettes.

Before you open the computer, take a look at the new hard drive's documentation. You'll need to write down the drive's **geometry**, or the number of read/write heads, tracks, cylinders, and sectors per track. Most laptop BIOS Setup programs will require you to type in this information so that the computer can recognize the drive.

Now it's time to open the computer case. Following the manufacturers' directions, open the hard drive bay or computer case. If your manual doesn't have directions for this, contact the manufacturer's technical support department and request instructions. They should have a sheet that they can mail or fax to you.

> **"Before you open the computer, look at the new hard drive's documentation."**

Remember to ground yourself frequently (by touching a metal object), and keep any screws, washers, or other small pieces you remove in a cup so you don't lose them. Go slow, take your time, and be careful. You'll be working in close proximity to the circuit board, and one slip with the screwdriver can gouge the board and turn your lovely laptop into a despicable doorstop.

Once the new drive is installed and the computer case is buttoned up again, you'll need to put your first DOS diskette in the diskette drive and turn on the machine ("boot it up"). For most laptops, it'll take longer to boot than usual, and the first thing you'll see is a message saying, "Hard Drive Failure". That's normal because the new drive has different parameters than the old one. Remember the geometry information we wrote down earlier? It'll be time to enter it in a moment.

If your laptop bypasses this step, don't worry. What happened is that the BIOS has a special setting called Auto Identify that read the geometry information right off the drive itself. Almost all current desktop computers have this setting, but not all laptops and very few laptops more than 2 years old.

Most of us will find ourselves in the System Setup program, and we'll need to enter the geometry information on the line called Hard Drive 0 (or Hard Drive 1 if there is no zero). You'll need to flip through the options on that line until you see the first item on that line, which will be drive type. Change this line to **user**. You then can move across the line, entering the information you collected. There might be a couple of items that you don't have information for, such as Write PreComp and LZ. Don't worry about them. New drives do that stuff automatically, and you can leave them untouched. Once you're finished, exit the Setup program, and the system will start from the diskette drive. The DOS installation program will walk you through formatting the disk and installing DOS on it, and you'll be ready (almost).

The last step is to use the RESTORE command included with DOS to replace all your programs and data from the diskettes onto the new hard drive. One benefit of doing the BACKUP/RESTORE combo is that all the special settings your computer requires are stored in the Autoexec.bat and Config.sys files, and these files will be replaced on your hard drive when you RESTORE. When it's done, restart the computer one more time, and you're back in business. ●

by Jeff Shapiro

Racing To The 'Net

The Future Of Online Services Depends On Today's Internet-based Strategy

The race is on! While most commercial online services offered no Internet access two years ago, today the four largest services—America Online (AOL), CompuServe, Prodigy, and The Microsoft Network (MSN)—can talk of nothing else. But while all provide Internet access, the World Wide Web is the site of the real action. In other words, anyone looking to understand the current state of the online market should turn their eyes to the 'Net.

Incorporating new Web sites; testing the Internet waters with cheap, subscription-based spin-off services and shared sites; offering free access during subscription drives; and, in one case, starting from ground zero and launching a new online service, are some of the ways the Big Four plan to woo new subscribers and keep old ones happy.

Why all the new efforts? Online cash, of course. LINK Resources estimates that by 1997, 20 million online users will spend $1.1 billion annually on online services. Last year, when online services saw revenues pouring out to independent Internet access providers, everyone rushed to plug into the 'Net. Stiffer competition for the user's cyberbuck this year means more services, access, and content. Many industry analysts predict subscription prices could decrease as services wrestle with different pricing plans. The future of commercial online services could very well become much like cable TV—one fee covering unlimited access.

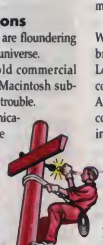
Certainly, all four services plan to expand Internet coverage and enhance their Web browsers with tutorials, search engines, hotlists, and parental controls. Each has just announced a service for exchanging E-mail with attached files to competitive services and anyone on the 'Net. Expect the number of Internet E-mail messages sent daily, currently more than 100 million, to increase.

Some observers fear Internet overload as online bandwidths are choked beyond digital capacity. Depending on when you connect, 'Net access can be just as jammed and sluggish as the Los Angeles freeways at rush hour. To combat this, all four services promise upgrades on their proprietary software and Web browsers. Whether these changes deliver faster communications with fewer delays and hang-ups remains to be seen.

Bad Connections

A couple of notable names are floundering in the rapidly evolving online universe.

eWorld, Apple's 2-year-old commercial online service with 130,000 Macintosh subscribers is, like Apple itself, in trouble. But Cynthia Funnell, communications spokesperson, Apple Internet services, says she hopes moving to the Internet will broaden its audience. Expect eWorld to leap to the Internet by mid-1996. And while the final model for generating revenues still is being developed, Funnell says it will include advertising.



GEnie, a 15-year-old service, may be down for the final count. Last November, General Electric starting seeking buyers for the online service with 200,000 subscribers. At press time, there were no buyers nor concrete plans for its digital future.

America Online

Considered the pioneering force in the online revolution, AOL (800/827-6364, http://www.aol.com) attributes its explosive growth—it currently boasts 4.5 million subscribers—to its aggressive Internet strategy.

"We were the first to have Internet E-mail, first to offer access to newsgroups, and it's always been our intent to embrace the 'Net and provide Internet content for our members," spokesperson Pam McGraw says.

Communications—including chat rooms, message boards, and E-mail—is the busiest part of the service. AOL will focus on making these areas faster and more intuitive. Like Prodigy, it plans to increase its Center Stage celebrity chat events. McGraw says AOL will increase its relationship with high-profile partners in the sports, entertainment, and news media targeting mainstream consumers.

Subscribers now have several choices for the Web. They can use AOL's integrated Web browsers or any other Internet application. Look for even tighter integration between Web content and AOL, including an upgrade of AOL's browser with strong parental lock-out controls. Like MSN and Prodigy, AOL will increase the amount of Internet connection icons scattered around the service.

"Instead of having a member go on the Web and try to find the best travel or publications on the Web, we've already done the homework," McGraw says. "All they do is point and click, and they're at the site."

AOL recently expanded its scope of online services with the release of GNN (Global Network Navigator), a new Internet-only service (800/819-6112, Keyword: gnn, $14.95 per month for $20 hours or $2.95 for additional hours). AOL members can access GNN screens through their existing service.

Like its competitors, AOL sees a market for users who only want to surf Web sites, which number well over 100,000 by most estimates and are growing. AOL plans to create

original Web sites and is investigating price models.

To fill the demand for unique content, the company has announced a new business division called The AOL Greenhouse designed to assist "infopreneurs" in the creation of online programming and interactive services for AOL and the Internet. New Greenhouse areas scheduled include: Extreme Fans! (Keyword: **extreme**) for sports fanatics; Motley Fools, for personal finance; iSKI (Keyword: **iski**) dedicated to skiing and snow sports; iGOLF (Keyword: **igolf**) dedicated to golf enthusiasts; and PictureWeb, an online photo service.

AOL is considering heavy-user pricing plans similar to the other services. Right now, the service costs $9.95 per month for five hours and $2.95 for each additional hour.

WOW!

No longer content to watch AOL and Prodigy cash in on the next generation of online consumers, CompuServe (800/848-8199, http://www.compuserve.com) is developing a new spin-off service called WOW! Expected to debut this spring, the newbie service will have a simpler interface, cheaper pricing, and a more streamlined selection of services, says Debra Young, CompuServe media spokesperson.

While details are skimpy, Young says Project WOW! will be rich in family content focusing on children, multimedia, sports, and entertainment—much like AOL and Prodigy. The service will include E-mail capabilities, Internet access, and parental control features.

At press time, neither pricing nor exact content were determined, but Young says Project WOW! will take full advantage of Windows and Internet programming languages.

CompuServe itself also will get a face-lift this year, says William Giles, supervisor of media relations. *WinCim* 3.0, the access software, will be released featuring a true Windows interface and parental control technology. With its recent acquisition of the popular *Spry Mosaic* Internet browser, CompuServe delivers full Web access through its proprietary *NetLauncher* browser, which features excellent Internet search capabilities.

Like MSN and Prodigy, CompuServe will continue to test various pricing plans. Its new Super Value Plan delivers 20 hours of full access for $24.95, plus $1.95 for each additional hour.

Prodigy

At press time, there were reports that co-owners IBM and Sears were both looking to sell their shares of Prodigy, which has seen sluggish subscription rates recently. The coming months will make Prodigy's future more clear

In the rush to the Internet, online services are developing sleeker interfaces, such as this one from Prodigy, and more convenient access to the Web.

In the meantime, Prodigy (800/776-3449, http://www.prodigy.com) has revamped its service very quietly while gearing up to reposition itself in the online marketplace. During the past four months, it has eliminated annoying advertising and switched from clunky, license plate user IDs composed of arbitrary numbers to standard Internet addresses, while adding forums and libraries.

"There have been some fairly stunning changes," Mike Darcy, program manager, communications, says. "And this is only the first step."

In the past year, the average Prodigy subscriber age dropped from 42 to 36—an indication, Darcy says, that the service is appealing to a younger audience. One of the more interesting ways Prodigy is considering showing off its new look is by opening its digital doors to all online users for free several times during the year—just like many cable networks unscramble their signals during "free weekend" subscription drives.

Like MSN, Prodigy, the third largest online service, plans to provide more Web content and test the Web waters by moving select forums out to the Internet. Like AOL, Prodigy plans to beef up celebrity online chats.

"In the past when people came to us with an idea and wanted to put up a forum, they had to learn our proprietary codes, which slowed down the process," Darcy explains. "Now, thanks to the **hypertext markup language** (**HTML**), we can get a site up and running in weeks instead of months." (HTML is the standard programming code used in Web pages.)

The conversion to Web programming has let Prodigy add a More About button to each subject area that links to related Internet newsgroups and Web pages. For example, if you Jump: **music**, then click Internet, you can pick from a list of Web sites. Clicking one sends you directly to the site without having to key in the URL, or the **universal resource locator** used as a Web address.

Like MSN, Prodigy will investigate and test a variety of new ventures. Darcy says he believes people who don't want to subscribe to Prodigy but want high-quality financial content will pay a small subscription fee around $4.95 a month—less if it's advertising supported—for that specific content.

"We're looking at a variety of business and consumer models, some are advertising supported, some joint ventures with independent Web content providers," Darcy says. "Our goal is to not limit ourselves. Everything is so new, we're still looking at taking parts of our service and how best to market and position them."

Helping with the evolution will be the next Prodigy update. One of its new features will be the ability to maintain separate IDs, but have them linked, so that E-mail is sent to one place. The system would be smart enough to answer E-mail with the proper user ID and eliminate the need to log on and off the service to access different accounts.

At press time, Prodigy access was limited to the slower rate of 14.4 kilobits per second

(Kbps), which negates the attractiveness of its 30/30 plan (30 hours a month for $30) because users chew up online time waiting for the hesitant information transfer. But faster 28.8Kbps speeds are expected by late first quarter or early second. In that same period, Prodigy will let users choose between its propriety Web browser and the popular *Netscape Navigator*.

MSN

The new kid on the cyberblock, Microsoft (800/386-5550) is making up for lost time. It entered the fray by creating a Web site (www.msn.com) offering many of its MSN subscription-based services free to Web cruisers. It also has signed several strategic co-ventures with entertainment industry giants such as NBC and Paramount to create exclusive programming. A recent pact with MCI Communications means Microsoft and the telecommunications company will market each other's products in several areas, including online.

"Our goal is to establish MSN as one of the premiere sites on the Internet," explains Larry Cohen, lead product manager, MSN. "We have a lot of great stuff we want to get out there for the Internet community to see. Not everybody has Windows 95 [which hosts the MSN interface] yet, and this is a way for people to see what makes MSN a great place to be and why you would want to join our community."

The new MSN Web site is accessible to users with any Web browser and lets developers use any Internet publishing software to design their pages. The site includes features such as an Internet tutorial, stock quotes, TV listings, movie times, news, and shortcuts to multimedia content available to MSN members.

But the assumption that this Web page and others like it will remain free forever is false, Cohen cautions. "We're the youngest online service, and MSN was designed to take full advantage of Internet standards," he says. "People want to be on the Internet, and we plan to fine-tune our marketing strategy to meet that need."

Like Prodigy and AOL, MSN has integrated links to Internet sites. MSN plans to experiment, creating content-rich sites on its network and then testing them on the Web in various subscription-based packages.

In December 1995, Microsoft announced two exclusive co-programming ventures with NBC. MSNBC Cable will debut later this year with 24-hour news and information programming. The online version, called MSNBC Online, will be distributed exclusively on MSN. NBC, which will televise this year's Summer Olympics, plans to share Web site content (www.olympic.nbc.com) with MSN. While the breakdown of what will be available on the Web and what will be on MSN is still being worked out, Ed Markey, vice president sports press and special projects, NBC Sports, promises unprecedented, behind-the-scenes Olympic coverage and "a very substantial presence on both the Internet and on the MSN." (See "Olympic Torch Burns Online" after this article.)

Exclusive online content also is coming from Paramount Television Group. Expect to see "Star Trek" and "Entertainment Tonight" properties, plus a third project in development for exclusive use on MSN, Cohen says. Paramount and Microsoft also are discussing three-dimensional navigable spaces, multiplayer gaming, full-motion video clips, animations, live interviews, and online shopping.

Cohen says it's only a matter of time before MSN and the Internet deliver full-motion, TV-like video. "As we start to go through **ISDN** lines, cable modems, and future delivery via satellite, we'll be able to deliver true video over these connections." (Integrated Services Digital Network [ISDN] lines transfer information at high speeds by leaving it in a computer's digital form.) Already MSN supports **TCP/IP** high-speed, dial-in numbers. (Transmission Control Protocol/Internet Protocol [TCP/IP] are standards used for exchanging Internet information.) Two hundred dial-up points of presence will be in place by the end of March, all supporting ISDN connection at no extra charge.

Expect the volume of news, games, and services on MSN to expand as Microsoft products evolve into interactive Web sites such as Cinemania Connection for reviews and movie links.

MSN also is testing Virtual Chat capability that lets users create their own animated icons, or **avatars**, to communicate in chat mode. In the future, MSN plans to let users add sound clips or voice attachments to MSN messages.

Since its debut in August 1995, MSN has captured 600,000 subscribers and expects to top 1 million soon. The company currently has four pricing models and is investigating others, including the possibility of a flat fee for unlimited time.

As examples such as Microsoft's flat fee idea become more common, industry analysts expect the traditional online model to change drastically as commercial online services evolve into super Web sites. All will require tremendous amounts of new, more exciting and different content, says Prodigy's Darcy.

But making the content profitable is the real money question. In today's cutthroat online market, only one thing is for certain according to CompuServe's Young: "Once you see something successful at one service, everyone else will follow." ●

by Michael Cahlin

Crowded At The Top

America Online and CompuServe stepped away from the pack in last year's race for online subscribers.

	Number of Subscribers		
Service	**Dec. 31, 1994**	**Sept. 30, 1995**	**Dec. 31, 1995**
America Online	1,500,000	3,800,000	4,500,000
CompuServe	2,450,000	3,540,000	4,000,000
Prodigy	1,200,000	1,720,000*	1,600,000*
The Microsoft Network	#	200,000	600,000

* IISR estimate # service launched Aug. 24, 1995
Source: Information & Interactive Services Report

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Olympic Torch Burns Online

Even though the 1996 Summer Olympics are still months away, one gold medal winner could already be crowned. (And we don't mean the U.S. men's basketball team.) The Olympian computer technology that will track and report every time and score in Atlanta is already a big winner in every category.

Computers at the Olympics are nothing new. They've been used for years to track stats, events, and even to keep athletes on schedule. CBS was the first network to break the online barrier with a Prodigy forum during its coverage of the Lillehammer 1994 Winter Games.

"But thanks to the 'Net, everyone around the world will have instant access to Olympic information at their fingertips 24 hours a day," says Rhonda Rattray, a 20-year IBM veteran "on loan" to the Atlanta Committee for the Olympic Games (ACOG). Rattray is responsible for working with the media and helping the ACOG with its online publishing needs.

This will be the first time in Olympic history that official event results will be broadcast on the World Wide Web minutes after they happen. But that is barely the tip of the technological iceberg that will appear in Atlanta's heat. In these Games, we'll be witnessing nothing short of a digital revolution in sports coverage.

IBM, the official Internet information system provider for the ACOG, has been preparing for the three-week-long Summer Games since 1992. The company's blanket Olympic solution is so revolutionary that it has already won contracts for the Winter and Summer Games in 1998 and 2000. Dubbed The Olympic Technology Solution, IBM's system features a combination of hundreds of mainframes, minicomputers, PCs, OS/2-based wired and wireless networks, and Internet access points. Add to this the total resources of the Internet, and there have been few times in history when so much technology has been harnessed in one place for one purpose.

The most anticipated achievement is the Results System capable of distributing event results to judges, scoreboards, television broadcasters, members of the press, and Olympic officials in real time.

Working with AT&T Corp., Motorola Inc., BellSouth Corp., and others, IBM hardware, software, and networking solutions expect their Olympic data broadcasts to find an audience that will include the more than 2 million people attending the games in Atlanta from more than 200 countries, the 3.5 billion television viewers worldwide, the 40,000 Olympic volunteers, and 15,000 members of the international press.

Online Coverage

Those without a modem and a connection to the World Wide Web—either directly or via online service—must wait until July to have the XXVI Olympiad data spoon-fed to them by the television and print media. But anyone with online connections can retrieve the Olympic information that interests them right now.

Not surprisingly, all Olympic information won't be free to the people. Because companies hope to magically transform cyberspace bits into cash, competition for your online dollar will be as competitive as any Olympic event. All major online services plan Olympic coverage, but the real action is expected on the Web with plenty of independent and cross-linked Web sites. While the Games are still several months away, here's a sampling of what's available now and what's coming.

ACOG. While other providers are still working out electronic kinks in their Web sites, by the time the Games officially begin, ACOG, the only official Olympic Web site (http://www.atlanta.olympic.org) co-created with IBM, will have been in operation for 15 months.

Log on to the Web site today, and you'll find links to: Welcome To The Games, Sports & Venue, Official Program, Travel And Ticket Information, Official Products, News, Fun Stuff For Kids, and much more. You can view the latest newsclips from WXIA-TV, Atlanta's official Olympic TV News station, as well as take a peek at the massive efforts the ACOG still must complete. Tasks still pending include setting up 6,000 desktop, laptop, and palmtop computers; installing more than 1,000 desktop laser printers, 13,000 telephones, 11,500 television sets, and 80,000 cable installations; and programming more than 6,000 pagers!

The ACOG site already receives 32,000 hits daily. Rattray expects millions of hits every day the Games are played from July 19 to August 4. The ACOG is expected to stay online at least until the end of

August 1996, but Rattray hopes "we'll stay through the end of the year."

NBC & MSN. NBC's exclusive TV coverage of the 1996 Games spans a staggering 168.5 hours of coverage and will be seen by an estimated nine out of 10 Americans. However, the network's Olympic online coverage (www.olympic.nbc.com) "will be the most ambitious site in cyberspace," predicts Ed Markey, vice president of sports press and special projects, NBC Sports.

While the breakdown of what will be available on the Web and what will be on The Microsoft Network (MSN) is still being worked out, Markey promises unprecedented, behind-the-scenes Olympic coverage and "a very substantial presence on both the Internet and on the MSN." Count on NBC to provide regular program information, highlights, and news. Just as the network will hype its presence on the Internet, so will Olympic sponsors with Web sites highlighted in TV and radio sports.

"We're working on a lot of joint ventures, content partnerships with people that know the most about various Olympic sports, including *Velo News*, a major cycling publication, *Track & Field News*, International Gymnastics, and the USOC (United States Olympic Committee)," Markey says. "We will have contents of every Olympic sport, so you will know U.S. competitors, international athletes, and the schedule of all TV coverage of events leading up to the Olympics. And all our Olympic analysts and on-air commentators will be involved."

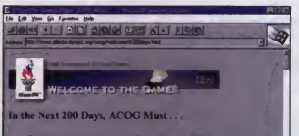
Markey expects NBC Sports personnel, including commentators, analysts, and researchers, to go online and field questions and comments from Web users and MSN subscribers.

Current Web site topics include: Sports On The Olympic Program, Athlete Profile Of The Week, Day-In-The Life Of An Olympic Hopeful, Olympic Torch Relay, Event Programming, General, and The Latest Information.

While NBC and MSN plan to share information, look for actual video, audio clips, and advanced coverage exclusively on MSN. Plans also are being discussed to conduct various online polls relating to the Summer Olympics and report the results on both TV and online.

To locate MSN's Olympic coverage, after you log on, right-click the MSN icon at the bottom of your screen, select Go To, and type **olympic**.

America Online (AOL). With bare bones coverage today, AOL plans to beef up its Olympic coverage as the Games get closer. Keyword: **olympic** sends you to the 1996 Olympic Forum where you can access the message board, headline news, an Olympic Trivia game, and an electronic forum called Olympians Online hosted by broadcaster John Naber, a 1976 gold medalist.



Sites like this one from the ACOG keep fans informed about the Games and might make them sympathize with jobs ahead of organizers.

CompuServe. Not known for its family content or sports coverage, CompuServe, at press time, did not offer any Olympic-specific forums or coverage. Look, however, for extensive Olympic coverage in the *Sports Illustrated* forum (Go: **si magazine**) and Associated Press Online (Go: **ap**, click Sports, then click Olympic And Other Sports.)

Also expect Olympic coverage on CompuServe's new family-oriented service, "Project WOW!", scheduled to be distributed in the spring to compete directly against Prodigy and AOL.

Prodigy. "At the very least, we will do what we've done in the past," says Mike Darcy, Prodigy's program manager, communications. "We will have an Olympics section that lists all the events and real-time results of all the competitions so our members will know what's going on in all the events, not just the ones that TV shows."

Working with IBM, Prodigy will have news stories, photos, and sound clips from all the competitions. "We will also have medal tallies for all the nations, as well as bios, profiles, and photos of the competitors," Darcy says.

As the Games draw near, Prodigy expects to have Chat sessions with athletes, celebrities, and other professionals involved with the Olympics. Darcy adds, "Prodigy will be doing a lot more; we just don't have the details yet."

The Web. No matter what Olympic information you're looking for, you can bet it's already on the Web. A quick WebCrawler search under "Olympic Games" netted 847 hits. From services such as renting hotels and homes to using bulletin boards to exchange notes with fellow online users to buying tickets for events, industry analysts expect the Internet to be a hotbed of Olympic activity.

But not every site is sanctioned by the U.S. Olympic Committee (USOC) or ACOG, so be careful. The good guys aren't the only ones hoping to get your money. If a site is officially licensed, it will say so. Otherwise, beware of misleading titles such as "authentic" and "special". Some sites will state up-front that they are unofficial and not associated with either organization.

The best nonsanctioned site is that of the *Atlanta Journal & Constitution* (www.ajc.com). A premiere Southern newspaper (actually a morning and evening paper published by the same company), the *Journal & Constitution* is determined not to be outdone in providing blanket Olympic coverage, especially in its own backyard. Its Olympics Report and Olympic Update have daily features and provide a full-color Olympics Guide, a sport-by-sport schedule, and a preview of the Olympic festival. The '96 Games Event Guide provides contest dates and times as well as a minirundown on the ticket situation, limits, and who to watch. There are also plenty of links to other official sites.

In addition to Web sites, don't forget Usenet **newsgroups**, Internet-based discussions that cover thousands of topics. The Internet's traditional newscaster, Clari, already has established clari.sports.olympic. User-initiated groups are expected to mushroom from the one, rec.sports.olympic, that's currently available.

One hundred years after the birth of the modern Olympics, online sites represent a passing of the torch into cyberspace, sparking interaction that fulfills the intent of the Games—to encourage peaceful, global communications. Let the cybergames begin! ●

by Michael Cahlin

Find It PLUGGED IN ONLINE

Digital Illusions Magazine
http://www.mcs.net/~bcleach/illusions

To see the future of digital imaging, look no further than this illustrative World Wide Web site.

Hardware and software reviews, press releases from companies that specialize in digital imaging, interviews with professionals in the industry, and occasional articles that address various digital imaging issues keep you updated on this new technology. You also can link to the Web sites of computer graphics companies, learn how the entertainment industry uses digital imaging, receive technical assistance with digital imaging questions, and share your own knowledge with others online.

Sandra's Clip Art Server
http://www.cs.yale.edu/homes/sjl/clipart.html

OK, so these aren't great art, but they're just as important if you like to add simple graphics to letters and other documents. You can access, view, and download hundreds of basic illustrations, ranging from holiday greetings to nature scenes to simple cartoons.

Graphic Arts Forum
AOL Keyword: graphics Graphics
CompuServe Go: graphics

For details on these useful resources see "Downloading And Viewing Images" in this issue.

The Digital Image Center
http://www.lib.virginia.edu/dic

These images, which are used by the University of Virginia's School of Architecture, are a great collection of digital images and well worth a look, especially from anyone interested in Renaissance architecture. Unlike many images on the Internet, these pictures are exquisitely precise in detail and are relatively quick to load and view. They make great wallpaper for your desktop, also.

Agfa Home Page
http://www.agfahome.com

This informative Web site, maintained by the German photographic material manufacturer Agfa, provides you with information about the latest technology in digital cameras, scanners, and other video-capturing components for the computer. Even if you're not interested in purchasing an Agfa product, this site will educate you about digital video products that are currently on the market, as well as those that are expected to be released soon. For users who do own Agfa products, this site also offers technical assistance, shareware for use with the products, and other valuable information.

Tree n' Iggy's Easter Extravaganza
http://www.teleport.com/~green

"Extravaganza" isn't quite the word to describe this page of eggs and bunny rabbits. "Smattering" would more appropriately describe the few offerings here. As the best of the few Easter sites on the Web, however, Tree n' Iggy's does offer a few goodies for youngsters. Kids can find an egg illustration to be decorated later, pick up a colorful Easter basket picture, listen to an obnoxious message from the Easter Bunny, and link to a couple of related sites.

GolfWeb
http://www.golfweb.com

Warm weather means only one thing to many Americans: FORE! But if winter decides to extend itself into April for a few unwelcome weeks, don't get mad. Simply jump on over to GolfWeb, where every day is spent on the links and you can catch up on the latest golf gossip, discover the best places in the world to play a round or two, and stroll through the ProShop searching for the newest addition to your bulging golf bag. And don't get too glum about the cold and rain: Bad weather can't shut your local 19th hole.

John Skilton's Baseball Links
http://www.ssnet.com/~skilton/baseball.html

Just in time for opening day, this site keeps you aware of baseball news from around the world. More than 600 links take you to Web sites that explore almost every facet of baseball. Spend a little time at this site, and you'll start to smell freshly cut grass and hot dogs; you'll start to hear the crack of the bat and the cries of peanut vendors; and you'll almost be able to see in your mind's eye a sport played by upstanding, responsible men who appreciate the auspicious opportunity they've been given to play the sport they love for a living and who are proud to be role models for today's youth. Well, we did say almost.

Ask Earl: The Yard-Care Answer Guy
http://www.yardcare.com

April showers bring May flowers . . . but not if the weeds get there first! For those of you who prefer to do your spring cleaning out of doors, this page will provide the answers to many of your lawn-care questions. Learn the best way to mow your lawn and how to combat pesky weeds. Find out what type of insect is causing your grass to turn brown. Earl will help you develop that green thumb if you haven't already. ●

Compiled by Jeff Dodd

Downloading And Viewing Images

Downloading and viewing images are two of the most controversial and fun things you can do online. From the fantastic to the risqué, libraries of digitized images are the most popular sites on commercial online services, bulletin board systems (BBSes), and the Internet.

How popular are they? On America Online's Portrait Gallery—a forum showcasing pictures of its members—new entries are downloaded 3,000 times in less than a week.

But not everybody is downloading images of other people. Graphics files come in a variety of forms such as word processing, spreadsheet, and database formats. Already, more than 1 million E-mail messages using a combination of text and graphics formats are sent through the Internet every day. Millions of users download files from online locations around the world at the same time. Clearly if all these folks can download, it means that if you can click a mouse, you can download and view graphics and images.

Downloading files from the major online services is fairly easy. Nearly all files are located in areas called libraries or bulletin boards. You usually won't be charged for the files you download, but you'll rack up connect-time charges during the download. Check your service's policy to see if it charges extra for certain downloads. Most services give an estimated time required for a particular download, letting you estimate the connect charge you'll accumulate. Most also contain download management programs that let you set a download to take place later and that can automatically disconnect you from the service when downloads are completed.

You'll sometimes receive files as attachments to E-mail messages. The process for downloading these attachments depends on your E-mail provider, but most require a simple click on a button. For most online services, you'll click a Download button inside the E-mail window while reading an E-mail message containing an attachment.

A View To A File

Once you've downloaded files to your hard drive, viewing the graphics and images can present new challenges. Think of files and viewers this way: Just as you need a slide projector to view photographic slides, you need special software, a **viewer**, to look at graphics files. A .TIF image (in the popular Tag Image File Format) needs a .TIF viewer, and a .GIF image (in the Graphic Interchange Format) needs a .GIF viewer. (For details, see "Choosing A Graphics File Format" in this issue.)

You can download viewers from online services such as CompuServe or buy software add-ons. But if you're using Windows 95, or any number of Windows 3.1 utilities, subscribe to a commercial online service, or use a popular telecommunications package (such as *Procomm Plus For Windows* or *Cyberjack*), you probably already have what you need. Older versions of *PC Tools* and *Norton Desktop*, for example, have viewers. These applications let you see graphics and images as they are downloaded so you can stop the transfer if an image isn't what you wanted. Files are loaded and viewed using point-and-click features similar to Windows 3.1's File Manager or Win95's Explorer.

Here are instructions for downloading files and finding viewers on major online sources:

America Online

Downloading. Click the Computing button at the main menu, followed by the Software Center icon. Then click the Search The Libraries icon. Click a category box and/or type in the search box to narrow the available files. In the File Search Results window, you'll see the results of your search. Double-click a file name to see a description of the file, including an approximate required download time. Click the Download Now button to begin the download process immediately.

Viewing. America Online (AOL) lets you view .BMP, .GIF, .PCX, and .JPG files as you download them, but you'll need AOL version 1.5 or newer. CompuServe's limited built-in viewers only load and view .GIF, .JPG, and .PNG graphics. Prodigy currently ships with no built-in viewers.

To turn on AOL's graphics preview feature before downloading a file:

1. From the menu at the top of the screen, or at WAOL, select Members.
2. From new menu, select Set

Preferences.
3. Select Graphics.
4. Select Display Image Files On Downloading.

Two other terrific sources are Viewer Resource Center (Keyword: **viewers**) and Graphics Arts Forum (Keyword: **graphics**). The Viewer Resource Center makes it easy to select files and viewers. To select a recommended viewer, click the Windows/DOS icon, then Images—.GIF, .JPG, .BMP, .TIF, etc. The Graphic Arts Forum supplies additional information on viewers. Click Special Interest Groups, then click Software Libraries to download a smorgasbord of viewers or explore several Internet graphics sites.

CompuServe

Downloading. From the main menu window, click the Explore CompuServe icon, and then select the division of software you want to search in the Find A File window. Click the Access File Finder button. In the Select Search Criteria window, you can enter some words to limit the scope of your file search. Click the Search button to begin the file search, and click the Display Selected Files button to view the list. Click any listing to see more information about the file. To download a particular file, highlight the file name, and click the Retrieve button. Click the Save As button to begin the download process. CompuServe continually will show the time remaining for the download.

Viewing. Not to be outdone by AOL, CompuServe also delivers an all-in-one graphics resource center (Go: **graphics**) with graphics programs, support, news, and more. With thousands of graphics and images in forums all over CompuServe, click the Graphics File Finder icon to locate viewers. After selecting Search Criteria and entering **graphic file viewers** under Keyword, click Display Selected Titles, then point and click the viewer of your choice. For additional help, check out the Gfx Welcome Center Forum (Go: **grfwelcome**).

The Graphics Visual Index Forum (Go: **grfindex**) is a clearinghouse for all graphics forums. A thumbnail picture of the actual graphic is tagged with information to make locating the files a snap. The Graphics Support Forum (Go: **graphsup**) offers help and program files for viewing, downloading, converting, and printing graphics.

Prodigy

Downloading. At the main screen, click the Jump menu and the Jump To command. Type **file libraries**, and press ENTER to access the File Libraries screen. Click the File Libraries hypertext string. Select the library and topic you want to access. Click the See Files button, then click the file you want to download. Click the Download Now button to begin the downloading process. A status window will track the time remaining.

Viewing. You must shop around for information on file viewers and places to download them on this service. From the main Menu, click Computers, then More About Computing, then Software, then File Libraries. To actually download file viewers, your best bet is a Web site created by Prodigy (and available only through Prodigy) called Bits & Bytes (http://antares.prodigy.com/web/livedigi/bitscoi.htm).

The Microsoft Network

Downloading. Find the bulletin board from which you'd like to download a file by clicking your right mouse button (right-clicking) The Microsoft Network icon in the Taskbar and then left-clicking the Find command. Type a search word in the Find box, such as **games** or **graphics viewer**, and press ENTER. You'll receive a list of potential categories; double left-click the category you want to access. Depending on the category you've chosen, you may have to leaf through a few more subcategories before reaching the bulletin board screen, which contains a list of available files. Left-click the file you want to download to see information about the file. To begin the download, double left-click the file icon. The time remaining on the download will be continuously updated.

Viewing. Right now, MSN does not have a specific graphics resource center nor a network-wide file-finder utility, so hunting for graphics viewers is reduced to a hunt-and-peck operation. To locate shareware, right-click the MSN icon on the bottom of your screen, then Go To: **shareware**. Double left-clicking the Shareware Forum icon reveals

File Decompression

When you download a file, it probably will be **compressed**, meaning the amount of storage space it occupies is lowered. Network server operators compress files so they can store more files on their servers. Some .ZIP, or compressed, files consist of only one file; others contain several files.

You can spot compressed files because they nearly always have .ZIP extensions, meaning they probably were compressed with either *PKZIP* from Pkware Inc., a software compression program that works in DOS, or *WinZip* from Nico Mak Computing Inc., which works in Windows. Both programs are shareware and are available for download on all major online services and many bulletin board systems. We'll show you how to use both programs for file expansion.

WinZip. From the Windows File Manager or My Computer window, double-click the .ZIP file you want to decompress. This action will open the WinZip program and display a window containing the files that will be created if you choose to decompress the file. Click the Extract button to begin the extraction. From the Extract window, you can choose in which directory you want to store the files. Click the Extract button to begin the decompression process.

PKZIP. From the DOS prompt, type **pkunzip** followed by the name of the file you want to decompress followed by the directory to which you want to save the extracted files. For example, to decompress Drawing.zip to the Draw subdirectory, you'd type:

```
pkunzip drawing.zip c:\draw
```

at the DOS prompt.

You'll find some downloadable files that are **self-extracting**, meaning they are .EXE files that don't require a decompression program. When you run the file, it automatically decompresses itself. Similar to .ZIP files, a self-extracting .EXE file can contain one file or several files. Before running such a file, though, you'll want to be certain you've placed it in its own directory so its decompressed files aren't scattered all over your root directory.

several choices including DOS, Windows (16-bit), and Windows (32-bit) libraries. Double left-clicking any of them sends you to various libraries; each, however, includes a Multimedia/Graphics section. Other choices include: Shareware Files Library, Shareware Tools Library, and Dr. File Finder's Picks. Finally, double left-clicking Other Places To Visit sends you to various Shareware Sites On the Internet.

World Wide Web

Downloading. When visiting the Internet's World Wide Web sites, your Web browser handles all of the downloading, but it simply downloads text and graphics elements temporarily while you're viewing the page. If you want to save a particular text string or graphics element to your hard drive, the best method we've found is simply choosing a Save As or similar command while the page is visible on your screen. This method should work for most text elements and for graphics elements that are alone on a particular page.

Viewing. On the Internet, our WebCrawler search for the words "graphic viewers" uncovered 1,300 choices; "file viewers" produced more than 1,600. Don't panic! Start at the Graphics Viewers, Editors, Utilities, and Info site (http://www2.ncsu.edu/bae/people/faculty/walker/hotlist/graphics.html). It dishes out tons of information about the most popular graphics and graphics viewers as well as just about every other format.

When downloading a file from a BBS, you usually must navigate a menu-driven system rather than the graphical user interface (GUI) you'll find with the online services. You also need a communications program.

Seeing In Windows

If you have Win95, you have *QuickView*, a basic file viewer that lets you examine a file without loading it into its respective application. QuickView isn't a standard component of the typical Windows installation, which means you must use the following instructions to install it:

1. Insert your Win95 CD-ROM (or insert your main diskette into your A: drive).
2. Go to the Start button, and select Settings, then Control Panel.
3. Double left-click the Add/Remove Programs icon.
4. Left-click the Windows Setup tab.
5. Select Accessories.
6. Left-click details, then scroll down until you find the QuickView option.
7. Check the QuickView option, and left-click OK. Follow the prompts.

To view a file:

1. Open Explorer.
2. Search for files using your mouse or using file search under Tools, Files, Files or Folders.
3. When you find the file you want to view, highlight it with a left-click.
4. Right-click.
5. Select QuickView from the pop-up dialog box.
6. Double-left click. Common files are viewed immediately. If the graphics file doesn't appear, QuickView doesn't support that file format.

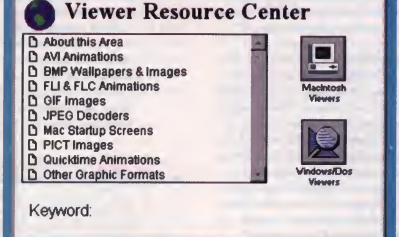
QuickView can view 30 popular file formats, but it can't switch one graphic format to another—say .BMP to .PCX. Downloaded Web pages are viewed only in draft mode—making it impossible to decipher Web documents written in hypertext markup language (HTML).

Inso Corp.'s *QuickView Plus* offers help with support for more than 200 applications from word processors to graphics formats across all platforms. QuickView Plus works exactly like QuickView. The Windows 3.1 version integrates with Program Manager or hooks into any word processor, E-mail package, or Web browser so you can view files—including HTML—with full formatting intact. QuickView Plus uses familiar File Manager commands and an easy-to-understand, split-screen mode.

Like its Windows 3.x sibling, the Win95 version is smart enough to search your hard drive and integrate with *Norton Navigator, Microsoft Exchange*, and popular Web browsers so you can view files before downloading them. Both versions let you zoom and rotate images. QuickView Plus also doubles as an excellent format-conversion utility.

For more serious graphics file manipulations, check out the packages reviewed in "Photoediting Software: How Do The Packages Differ?" in this issue. Whether it's a simple tool or a serious graphics package, get the software you need, and happy viewing! ●

by Michael Cahlin and Kyle Schurman



A little searching turns up a wealth of online libraries, like this one on America Online, that contain graphics, images, and viewers.

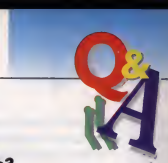
For More Information:

PC Tools, Norton Desktop
Symantec Corp.
$89.95 each (all prices are street prices)
(800) 441-7234, (503) 334-6054

Cyberjack
Delrina
$79
(800) 441-7234, (503) 984-2475

Procomm Plus For Windows
Datastorm Technologies
$135
(800) 315-3282, (314) 443-3282

QuickView Plus
Inso Corp.
$49
(800) 333-1395, (312) 329-0700



Need help with your hardware or software?

Looking for simple explanations on technical subjects?

Send us your questions!

DOS COMPUTING

Q: *I have an old IBM PC-XT. Lately when I start it, I get the message "Non-system disk or disk error. Replace and strike any key." What can I do?*

A: When a computer starts up, it looks for an operating system (DOS, Windows 95, etc.). The disk it finds that operating software on is called a system diskette, bootable diskette, or DOS disk. In the past (before anyone had hard drives), people kept their operating systems on a diskette in the A: drive (something that's done only for emergencies now). The computer's habit of looking first on its diskette drive is carried over to most modern computers. This isn't a problem if there isn't a diskette in your diskette drive. But if you've left a diskette that *isn't* a system diskette sitting in the A: drive, you'll see that error message. It's saying, "I found a diskette in A:, but it's useless to me."

If there isn't a diskette in the A: drive, the computer then looks at your hard drive (usually called C:) for an operating system. If that disk isn't working or the operating system isn't there, you'll get the same message. So, assuming your problem isn't a forgotten diskette in your A: drive, do this: Get a real DOS system (bootable) diskette and put it in the A: drive (see "In Case Of Emergency, Grab Bootable Diskette" in the October 1995 issue of *PC Novice*) and restart the computer. That should start it and get you to an A prompt (A>). Then type **c**, and press ENTER. If you get the message "Invalid drive specification", it means your hard drive is completely out of service, and you probably either need a new disk controller card (which costs about $20) or a new hard drive.

If you get a regular C> prompt and can operate on the C: drive, it means the drive is running but has lost its operating system. In that case, to replace the operating system, type the following, pressing ENTER after each line:

```
cd dos
sys c:
```

NOTE: The bootable diskette you use has to be the same operating system version number as you had on the computer before the problems started. To see what version the bootable diskette is, type ver, and press ENTER after it boots/starts.

WINDOWS 3.1

Q: *I have Windows for Workgroups (WFW) 3.11 and QuickBooks for Windows. When Windows starts, I get the following message:*

"Cannot find a device file that may be needed to run Windows. Make sure that the Path line in your Autoexec.bat points to the directory that contains the file and that it exists on your hard disk. If the file does not exist, try running Setup to install it or remove any references in your System.ini file. C:\QBWIN\Vfintd.386. Press a key to continue."

When I continue, the system and QuickBooks appear to function normally. What does this mean, and what should I do? I suppose I could "remove the reference" as they ask, but since the message refers to the QBWIN directory, I was wondering why that reference even was generated? In other words, why would Windows be looking for Vfintd.386 in my QBWIN directory? What is the Vfintd.386 anyway? Will it not being there affect QuickBooks?

A: We infer that when QuickBooks installed, it added a line saying "Device=C:\QBWIN\Vfintd.386" to your System.ini file. A quick check with the QuickBooks folks didn't dig up an explanation of *why* it might have done that. (It could have to do with letting QuickBooks maintain a "scheduler" to alert you of pending payments without conflicting with other drivers.) If you're not running the scheduler, that would explain why QuickBooks doesn't seem to care that the file's missing.

Vfintd.386 is a virtual device driver that helps Windows prevent conflicts. It's also used by MS-DOS 6.0's *Backup For Windows*, so if you ever want to use that backup software, you shouldn't remove the file or the reference to it. If you don't use MSBACKUP, you could edit your System.ini file (found in your WINDOWS directory) and remove the line saying "Device=C:\QBWIN\Vfintd.386". Or you can **point** the reference in Win.ini to the right place. (The technical phrase "point" simply means that the line that mentions the file correctly specifies what disk drive and directory the file will be found in.) Normally, Vfintd.386 is found in your DOS directory, and we'd almost bet you'll find it alive and well there. If so, to "point" to the right place, you'd replace your present line with one saying "Device=C:\DOS\Vfintd.386".

WINDOWS 95

Q: *One of my PIFs (Program Information Files) in Windows 3.1 was set up so that when I clicked its DOS program icon, it would bring up a dialog box that would let me type in a parameter*

WINDOWS 95 (cont.)

that the program would use as "extra directions" when it started up. The reason was that this program could be started with some essential/useful parameters, but the parameter would be different each time. This was more practical than setting up six different startup icons for this one program, and it worked just fine. When I installed Win95 on top of my old Windows, the "properties" of this DOS program did indeed adopt all the properties I'd set in my old PIF, except for one. The property that is no longer possible is the ability to have the icon stop and ask for a parameter. Is this "parameter passing" feature in the Properties gone forever?

A: Add a question mark after your .EXE on the command line in the Properties setting of your new shortcut/icon. Right-click the shortcut to your DOS program, then left-click Properties. Left-click the Program tab, then in the box provided for the Command line, type ? at the end of the line. Then, later, when you double left-click the icon/shortcut for the program, a dialog box will appear that asks users to enter their favorite parameter.

ONLINE COMMUNICATIONS

Q: *I saw an ad for a modem that claimed it would let me connect to another computer by modem and still be able to talk on the phone—using only a single phone line. It costs a lot more than a regular modem, so I wanted to know if these things really work, and what, if anything, is the catch?*

A: The modems are called DSVD (Digital Simultaneous Voice and Data) modems. Yes, they work, and it's often great to be able to be online and talking at same time. There are, however, a couple of catches. You almost put your finger on the first catch: At a cost of around $600 (vs. $150 for a plain modem), we're not sure the bean counters would approve. For about $50 installation plus $10 per month in most places in the United States, you can get a *real* second phone line, which is even better. (For example, with the DSVD deal, you can talk during a modem session only to the same number. But with a second line, you can call, or be called, from anywhere.)

There's also the problem that there's not yet a real standard for how DSVD modems talk to each other, so, for now, you'd have to have the *same brand* of DSVD modem on both ends. Then (partly because of the same-brand-on-each-end deal), you'd discover that as far as the Internet or commercial online services go, there's no provision for taking advantage of your DSVD feature. There is one situation where we think DSVD modems might make sense, however: Say you have a business contact in Mexico (or another locality where one has to wait years, or marry the President's daughter, to get a second phone line.) And say monthly charges and toll charges are outrageous. If you do both talking and online data exchange, a pair of DSVD modems could be a godsend.

MISCELLANEOUS SOFTWARE

Q: *I have a few CD-ROMs full of pictures, which came with some books I purchased (such as "Photo CD Book," etc.). How can I view the pictures on these CD-ROMs without installing the software or the pictures onto my hard drive?*

A: Unfortunately, graphics files on CD-ROMs often need their own programs to display the photos in any practical manner, particularly if they're multimedia files with associated sound and motion. In the latter case, you'd probably *have* to install the specialized display software supplied on each CD-ROM. But, even then, the display software usually will leave you with the option of leaving the graphics and/or sound files on the CD-ROM. The display program itself usually takes only a megabyte (MB) or two (compared to the graphics files, which can total more than 600MB).

If it's strictly graphics files (pictures only), you may have another option: Graphics files come in many formats, such as TIFF (.TIF), bit map (.BMP), JPEG (.JPG), etc. DOS lacks the ability to view graphics files. Windows 3.1's Paintbrush program (in the Accessories group) can view only a limited number of formats, but Win95 has a better built-in viewer. There are a variety of general-purpose graphics viewer programs that would let you browse a CD-ROM, viewing graphics files in the most common graphics formats. Some of these are shareware programs, while some are commercial programs such as *HiJaak* from Quarterdeck. In addition, some general-purpose utility programs, such as *Norton Commander*, include built-in file viewers. Often online navigation software such as that supplied by CompuServe or America Online has the built-in ability to view graphics files found on a diskette or CD-ROM.

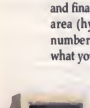
Q: *Last year when TurboTax and Quicken merged, I was hoping that my tax preparation would be improved by better integration between them, and it was. But I ran into one annoying limitation (which, I don't think existed before): My wife and I each run small businesses. Quicken lets me tell it, say, that any expense I categorized as Business Mail should (when I install TurboTax later) be sent over to my business tax return (Schedule C). The problem is, while TurboTax lets my wife and me have as many as six different businesses (six Schedule Cs), Quicken doesn't recognize the possibility of more than one business existing (more than one Schedule C). If I tell it to send a category over to Schedule C for TurboTax, I have to either do it for my wife's business or my own, not for each, or have it lump my wife's business in with mine on a single Schedule C. Question: Has this shortcoming been*

MISCELLANEOUS SOFTWARE (cont.)

remedied in the newest release of Quicken? Can you direct tax-related categories to different copies (say copy 1 and copy 2) of Schedule C? I've called Intuit and can't get an answer. They just suggested I should really be using QuickBooks instead of Quicken.

A: Your situation (needing separate Schedule Cs for two in-home businesses) doesn't seem that unusual. Though many people use Quicken for their home *and* small business accounting, the Quicken folks seem to be saying they think most small business owners should be using their other product, QuickBooks (which can do what you ask), for their business and Quicken for their home accounting. But, like you, we can see some situations where you'd like to keep all your accounting (home, investments, small home business) under a *single* software package. The feature you want is reasonable. Fortunately, this year it is possible with *Quicken 5.0 for Windows*.

From the HomeBase, go to the top menu and pull down Lists. Click Class, then New, then Copy Number Optional, and finally Help. When Help opens, look for a green shaded area (hypertext link) that says something about "copy number option." Double-click it, and Help will explain what you want.



COMPUTER HARDWARE

Q: *I have a DTK 386DX25 computer with two IDE hard drives attached to an IDE host adapter card. I recently installed a new IDE (ATAPI) CD-ROM drive, which came with its own IDE host adapter card. Now my hard drives seem to have slowed to an absolute crawl.*

A: Many newer CD-ROM drives use IDE connectors. They usually provide a cheap, fast, simple way to connect to the computer and are in many ways better than SCSI connectors or the rapidly disappearing proprietary connectors that were popular a few years ago.

You may have a conflict between the new IDE adapter and the old one. To find out, just temporarily disconnect one of your hard drives (the one that isn't C:), remove the new card/adapter, and connect the CD-ROM drive to the old adapter. If things run great that way, you have a choice of giving up one hard drive or buying (with return privileges) a new ATAPI/Enhanced IDE (EIDE) adapter card on which you can connect up to four IDE devices. (If this trick doesn't help, you still can try a new EIDE card.)

Since your older computer has an ISA bus (these buses are pre-1991) and not newer VESA or PCI slots/bus, you'll have to get one of the few EIDE cards that work on ISA-bus computers. Data Technology Corp. (408/942-4000) makes several inexpensive ones. Technically, an EIDE card for an ISA bus can't be called a "full" EIDE controller because it can't run hard drives at the fast speeds that most post-1994 EIDE hard drives are capable of. But they do provide two features of the EIDE standard: (1) They allow four IDE devices on one card, and (2) They allow drives bigger than 528MB.

NOTE: EIDE controllers have two plugs (one called primary and the other secondary). Each plug lets two devices connect to it via a single cable. But don't connect a hard drive and a CD-ROM *drive to the* ***same*** *plug/cable; in some cases, this will force the fastest device (the hard drive) to run as slow as the slowest device (the CD-ROM drive).*

Q: *When I turn on my computer, it gives the message "KB Interface Error", then hangs there. I was told by a repair shop to replace the motherboard. I suspect it might just be a poor connection somewhere because when the problem first started, I could sometimes "fix" it by knocking the case slightly. Do I really have to replace my motherboard?*

A: The message means there's a problem somewhere between the keyboard and the motherboard. If you haven't already tried using another keyboard, try that. Once in a while, we've seen this error message when, without their parents' knowledge, kids turn off a computer's KEY LOCK (usually near the on/off switch) and disconnect the keyboard. But your problem is probably at the actual keyboard interface parts, which are the electronic parts on the motherboard where the keyboard plug enters your case. The problem is that, while those parts are small and cheap, many repair shops either aren't equipped to replace them, can't get the parts, or don't want to bother. Look for a shop that's willing to replace the small parts (but be careful that you don't spend nearly as much for the repair as for a new motherboard). If you can't find someone to replace the keyboard interface chip, you'll need a new motherboard.

Q: *I'm interested in putting photographs onto the monitor of my old IBM-XT, such as the images one can download with a modem. My monitor is the monochrome, green-screen type. Is there a card made to display pictures that are sent or stored as color or different resolutions?*

A: The short answer is "no." The card you have probably is an old Hercules type that can't even display more than three shades of black. While we're not known for telling people they have to own the fastest Pentium, your computer is just too old and slow for doing anything with graphics. Even if you got a modern VGA card and color monitor, you'd still have the following problems:

a) Most of the useful graphics software runs under Windows, which your computer is too underpowered to run.

b) With a 20MB hard drive, you could fill up your whole drive with just a dozen downloaded color images.

COMPUTER HARDWARE (cont.)

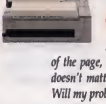
Q: *Some years ago, I got a computer that, as is typical, had a single 3.5-inch diskette drive. When I copied a diskette, I had to swap diskettes in and out because the DOS DISKCOPY command would repeatedly say "Insert source disk" and "Insert destination disk". So I had a second 3.5-inch diskette drive installed, and that let DOS make a copy (with the command* ***diskcopy a: b:****) in one fell swoop. Recently I've had trouble: The DISKCOPY command no longer works.*

A: Your CMOS setup (information your computer keeps in its own memory, even after you turn it off, about what drives you have) may have gotten scrambled (see "Changing Your Computer's Battery" in the March 1995 issue). Follow the directions in that article for changing CMOS settings, and make sure yours shows that it has two 3.5-inch diskette drives. Of course, there's always a possibility that one of the diskette drives is broken and needs replacing.

The best news is that, although four years ago you may have needed two diskette drives to get decent diskette duplication speed, these days you can do it with just one. You see, in the past, DOS didn't understand that your computer had sufficient RAM (memory) to temporarily hold in its memory the "image" of the entire diskette during a DISKCOPY operation. Thus the swap-the-diskette ritual you described. This was fixed in DOS 6.20, so if you type **diskcopy a: a:** with a newer version of DOS, it'll duplicate a diskette almost as fast and easily as if you had two diskette drives. (The same goes for using File Manager's Copy function found under the Disk menu.) This is one of several reasons to upgrade an older DOS; your workaround may be as simple as upgrading your DOS version.

Q: *I'd like a second opinion on a hardware problem. My monitor goes blank (intermittently, like maybe every third day), usually after about an hour of operation. The monitor continues to show power on. Checking for loose video cable doesn't help. Transferring the monitor to another computer seemed to suggest that the problem wasn't the monitor because the monitor worked with the other computer. The problem comes up mostly when my son works on the DOS-based, Type Tutor IV program, but that may be a red herring. Cold rebooting usually doesn't help. But turning off the computer and monitor and coming back, say, an hour later does seem to make the problem go away. Running DOS or Windows makes no difference. I suspect I have a bad video card. (It's four years old.) I could borrow a video card and install it and see if that makes the problem go away, but if there's some test that takes less work, I'd like to hear it.*

A: You're right that it looks like a hardware problem, and we agree it's almost certain to be a failing video card. Normally, you get this kind of problem when heat-sensitive components are starting to fail. Even if there were some diagnostic software we could recommend to test your video card, you'd still have a catch 22: While the card's working, the software would probably say it's OK. But while it wasn't working, you couldn't see the software on your screen to run a diagnosis. One possibility is that with age, the card's connection into its slot has gotten a little corroded or loose. Open the case (with the power off), and try re-seating the video card firmly in its slot. If that doesn't work, narrow the problem down to either the video card or monitor by trying this: The next time the thing flakes out on you, turn off *just* your monitor for an hour. Then turn it back on. If that seems to fix it, the problem's likely to be in the monitor. Otherwise, the *next* time leave the monitor on, and turn off *just* the *computer*. If you can turn off one consistently and everything works after it's had time to cool, the unit you cooled is likely to be the problem.



PRINTERS

Q: *I have an HP LaserJet 4 printer that I use with Window 3.1. I'm frustrated because if I try to print graphics that occupy more than, say, half of the page, I get an "out of memory" message on the printer. It doesn't matter if I'm doing many small images or one large one. Will my problem be solved if I add more memory to the printer?*

A: Yes. The memory (RAM) standard in many new printers is plenty for text printing, and for, say, a half page of graphics, but not for a full page. Part of the problem comes because this printer is routinely set to print at a high resolution (600 dots per inch [dpi]). To print any given image at 600dpi takes four times as much memory in the printer as does a 300dpi image. While 600dpi grayscale images (photographs, etc.) don't look nearly as good at 300dpi as they do at 600dpi, with other types of images (line art), you'd be hard pressed to tell the difference. So, until you can afford the extra memory, try this: When you're ready to print your pages of graphics, look for a button saying Setup in the Print dialog box (the box that asks you how many copies of each page to print, etc.), and press it. When the Setup dialog box appears, change the resolution (or print quality) to 300dpi. That should get the graphics out of your printer.

Don't forget: The printer will stay set at 300dpi until you set it back. You also can try getting into the printer's Setup options. There may be some options there, such as Page Protection, that help the printer stretch its limited memory further. Read the Help while in Setup. ●

Get straight answers to your technical questions. Ask *PC Novice*! Send your questions, along with a phone and/or fax number so we can call you if necessary, to: PC Novice Q&A, P.O. Box 85380, Lincoln, NE 68501. Please include all version numbers for all software about which you're inquiring, operating system information, and any relevant information about your system. (Volume prohibits individual replies.)

GLOSSARY
Of Terms

ASCII—American Standard Code For Information Interchange. A standard that represents text, punctuation, and other characters numerically. It involves no error correction and should be used only with plain, uncompressed text.

Binary—A number system based on 2. Only two numbers, 0 and 1, represent all possible mathematical values. Computers use this system because it best represents what a computer understands—on and off.

BIOS—Basic Input/Output System. A set of routines that work with a computer system's hardware to support data transfers among the various elements of a system, such as the monitor or disk drives.

Bus—The copper tracings on the surface of the motherboard that transmit data among computer components.

Clip Art—Predrawn images sold in large collections, usually on CD-ROM. Clip art can be added easily to documents.

Communications Software—Also referred to as telecommunications software, these packages let one computer connect with others across telephone lines (via modems) and share information.

Device Driver—Software designed to control a particular hardware device, such as a monitor. These drivers act as go-betweens for programs and devices, ensuring that the devices understand the software's commands.

Dot Pitch—The distance between the individual pixels (dots) that make up an on-screen image.

DRAM—Dynamic Random-Access Memory. Memory chips that store information in integrated circuits containing capacitors, which need to be recharged continuously.

Hard Drive—A nonremoveable (in most cases), high-capacity storage medium inside the computer's case that stores programs and data.

IDE—Integrated Device Electronics. A disk drive interface that eliminates the need for a separate adapter card because the controller electronics reside on the actual drive.

Jumpers—A group of small, metal pins with plastic blocks covering some of the pins. By changing the position of the blocks (which contain tiny electrical connectors), you can change the settings of a hardware device.

MIDI—Musical Instrument Digital Interface. A standard that lets electronic devices such as keyboards and sound cards communicate with each other.

Modem—A device that lets a PC communicate and exchange information with other modem-equipped PCs over telephone lines.

MPEG—Motion Picture Experts Group. A popular video compression standard used by most PCs that run video.

Online Service—A dial-up service that provides news, information, and discussion "forums" for subscribers with modem-equipped PCs.

Parallel Port—This port accepts cables that have parallel wires, letting data flow through the cable at a high speed. Parallel ports can transfer a complete byte of data at a time, while serial ports can transfer only one bit.

Refresh Rate—The number of times per second a monitor redraws its image. A 60Hz refresh rate indicates that the on-screen image is redrawn 60 times per second.

Resolution—A measurement, usually in dots per inch (dpi), of the sharpness of an image generated by a printer or monitor. Higher resolutions yield clearer images; lower resolutions make images appear coarse and out of focus.

Scanner—A photocopier-like device that uses light-sensing equipment to read a document and translate it into information that can be used on a computer.

SCSI—Small Computer System Interface. Used for connecting computers to peripheral devices (i.e., CD-ROM drives or printers), other computers, and local-area networks. Peripheral devices are attached to a single SCSI port through a series of connections called a daisy chain.

Self-Extracting File—A compressed file that doesn't need another program, such as *PKUNZIP*, to decompress. The file can be decompressed by typing its name.

Serial Port—The socket where cables attach a serial device, such as a mouse or modem, to the computer. Only one bit of data can be transferred through this port at a time, while parallel ports can transfer an entire byte.

SVGA—SuperVGA. SVGA cards provide 800 x 600 (or higher) resolution, display more colors, and perform faster than standard VGA cards.

VGA—Video Graphics Array. VGA provides a resolution of 640 x 480 pixels on-screen with 16 colors.

VL-Bus—VESA Local Bus. Local bus architecture developed by the Video Electronics Standards Association. Up to three VL-bus slots can be built into a motherboard, and bus mastering (a processing technique used by certain adapter cards) is allowed.

VRAM—Video Random-Access Memory. A special type of DRAM that's used in high-speed video applications.

Web Broswer—A program that provides an interface, either text-based or graphical, to the World Wide Web.

Zip—Slang for copying and compressing a file, usually with *PKZIP* software. A compressed file occupies 50% or less disk space than an uncompressed file. A compressed file cannot be used in its compressed form but has to be decompressed, or "unzipped," first.

FAX FEEDBACK

HELP US HELP YOU!!!

Has your old PC found a new job as a bookend, plant holder, or night-stand? Don't let your old software or your aging computers file for retirement just yet. Help *PC Novice* put together a new section focusing on problems and solutions encountered when dealing with older PCs.

Please take a few moments to fill out these questions and share your older PC and software compatibility difficulties and successes with us.

To show our appreciation for your comments, we will randomly select one Fax Feedback participant to receive a *PC Novice* T-shirt.

If you do not have access to a fax machine or would prefer to mail your response, please address your comments to:

Fax Feedback
***PC Novice* Magazine**
P.O. Box 85380
Lincoln, NE 68501-5380

Fax Number
402-479-2104

Topic of the month . . . What About Old PCs?

Here's your chance to voice your concerns and share your insights about old PCs and give some helpful information, too.

1. What kind of system(s) do you currently have at home?
(Please "X" all that apply.)
   - ☐ Pentium
   - ☐ 286
   - ☐ 486
   - ☐ 8086/8088
   - ☐ 386
   - ☐ Macintosh
   - ☐ Other (please list):

2. Would you like *PC Novice* to start a section focusing on how to get the most out of your old PCs and software?
   - ☐ Yes
   - ☐ No (If "No," please go to question #4.)

3. The focus of the articles in this section should be on . . .
(Please "X" all that apply.)
   - ☐ Upgrading hardware
   - ☐ Compatibility of newer software with older PCs
   - ☐ Use of old software
   - ☐ Potential uses for older PCs
   - ☐ Other (please list): _____

4. What problems have you encountered when working with older programs or PCs?

5. What tips or tricks have you learned while working with older programs or PCs?

We look forward to hearing from you. Thanks for your time!

Name and address:
This is optional but necessary to be included in the drawing.

Name: _____

Address: _____

Phone: (_____) _____

800 Reader Service

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IFC=Front Cover **IBC=Inside Back Cover** **BC=Back Cover**

Letters To The Editor

Dear *PC Novice*:

I had to write to tell you how much I have learned from your magazine. I recently purchased a new hard drive and was expecting my son to install it for me. Since he couldn't do it, I decided to do it myself. With much trepidation, I read all the manuals and books and found that nothing worked—I have never seen more error messages. Then I remembered having seen an article in *PC Novice* on "Upgrading Your Hard Drive" (November 1995). I started over and made a bootable diskette with MSBACKUP on it as per your instructions and from then on, it was pure joy.

I have always felt pretty ignorant when it comes to the internal workings of a PC. I know that there is so much more to learn, but with *PC Novice*, I am well on the way.

Many thanks again for a wonderful magazine.

Jane Wittstein/North Haven, CT

Dear *PC Novice*:

Thanks for putting out the best teaching and tutoring tool in the computer world for the millions of us who need to use computers on a daily basis but know absolutely nothing about them. With the help of your magazine, there is hope for us.

Keep up the good work; this is a compliment you well deserve.

Nathan B. Ben-Yehuda/via CompuServe

Dear *PC Novice*:

I have just finished absorbing your one of your Premium Editions that dealt with Buying and Upgrading, which was made available by Best Buy as a complimentary issue.

I can't thank you enough for all the knowledge and understanding of computers I gleaned from this issue; it should be mandatory reading for any "Introduction to Computers" course. I'm not "into" computers, but it's nice to be able to understand my sons when they discuss 386s, floppies, hard drives, motherboards, CD-ROMs, etc.

I will never have the knowledge and experience these two siblings possess nor do I even want it. But it is so nice to have some handle on the basic computer terms and not feel as if I am listening to a foreign language.

Thank you for helping me out.

John A. McGoldrick/Brooklyn, NY

Letters to the Editor should be sent to: *PC Novice* / P.O. Box 85380, Lincoln, NE 68501-5380. Letters may be edited for clarity or space.

On Newsstands March 19th

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